



# ***ELITYS-kodak*** ***2000***

**Very High Frequency Intra-Oral X-ray unit**

## A top of the line X-ray unit matching the new challenges of dentistry:

- Radioprotection and safety of both patients and staff
- Reliability and quality guaranteed by the most stringent medical standards
- Ease of use and user-friendly
- Perfect image quality - every time



# Generator

Very high frequency technology



# Generator

## Very high frequency technology

### Features

- very High Frequency: 300 kHz
  - elimination of soft X-rays
  - more penetrating X-rays
  - shorter exposure times, with a precision down to the millisecond
- 0.7 mm<sup>2</sup> focal spot (IEC)
- optional rectangular collimator

### User benefits

- patient dose reduction of 30%
- longevity of the X-ray tube
- less motion blurring
- sharp images
- X-ray protection and safety



# Generator

## Very high frequency technology

### Features

- choice of intensity:
  - 7 mA for film
  - 4 mA for RVG
- choice of power:
  - 60 kV for more contrast
  - 70 kV for more grey levels

### User benefits

- first X-ray unit specifically designed for direct digital radiography (dose reduction)
- selection of power according to exam type:
  - 60 kV for endodontics, caries detection, etc.
  - 70 kV for periodontics

# Generator

## Design and Ergonomy

### Features

- very light tube head  
(half the weight of  
conventional tube head)
- ergonomic built-in handle
- angulation scale
- elegant design and choice of  
materials

### User benefits

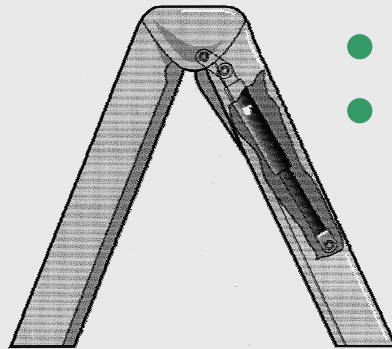
- easy manipulation and  
positioning
- fast and easy handling
- precise control of angulation  
(bisecting technique)
- smooth integration in dental  
practices

# Scissor arm

## Technology and design

### Features

- unique oil/air cylinder design (Trophy patent)



- choice of 3 arm lengths:

1,70 - 1,88 - 2,05 m  
67 - 74 - 81 "

### User benefits

- smooth and precise movement
- low inertia
- stable positioning

- adapts to every practice configuration

# Wall bracket

## Design and Flexibility

### Features

- magnetic attachment of handheld timer to bracket
- 3 mounting possibilities:
  - horizontal arm to the right
  - horizontal arm to the left
  - vertical
- optional pass-through bracket

### User benefits

- easy handling of timer
- adapts to every practice configuration



# Timer

## Technology and Design



# Timer

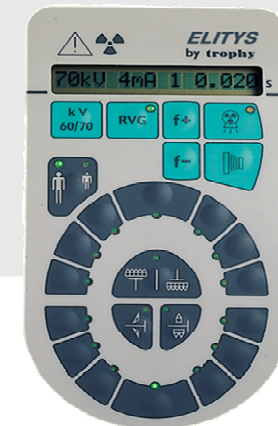
## Technology and High Precision

### Features

- Microprocessor control
- LCD screen display of exposure parameters:
  - power (kV)
  - intensity (mA)
  - exposure time (ms)

### User benefits

- precision and reproducibility of the exposure parameters (down to the millisecond)
- ease of use
- errors belong to the past



# Timer

## Design and Ergonomy

### Features

- extreme miniaturization:  
all functions are regrouped  
in a hand-held timer
- operation through  
a dental arch and  
self-explanatory icons
- optional remote  
timer kit



### User benefits

- easy handling and mobility
- straightforward use
- optimised exposure times
- each film is perfectly exposed  
and radiation kept to a minimum
- adapts to every practice  
configuration

# Interactive link with imaging station





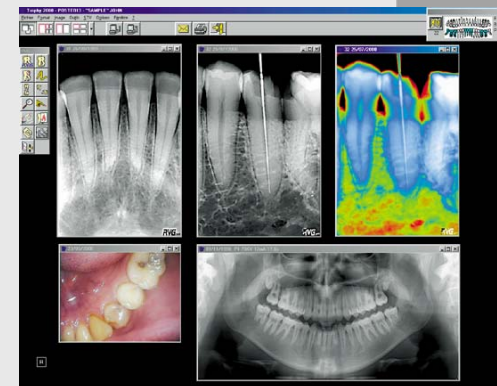
# Interactive link with imaging station

## Features

- automatic synchronization with RVG
- automatic download of exposure parameters (time, kV, mA) to Image Station, for display and storage with the image itself
- selection of Tooth number and patient type from Image Station
- display of error messages on the computer monitor (with explanations)

## User benefits

- perfect image quality
- patient dose tracking and radioprotection
- user-friendly operation
- easy trouble-shooting



# Very High Frequency

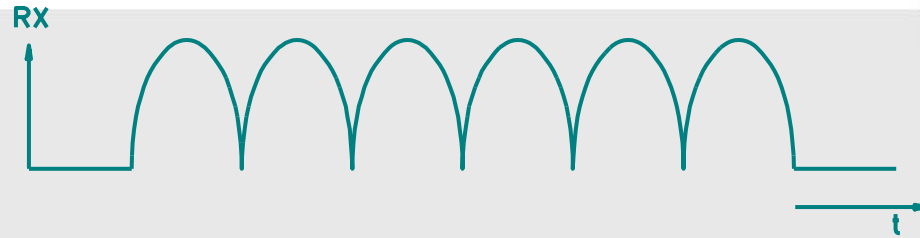
The Very High Frequency technology of ELITYS sets a new standard in dental intra-oral radiography, in terms of performance, image quality, and radioprotection



# Very High Frequency Technology

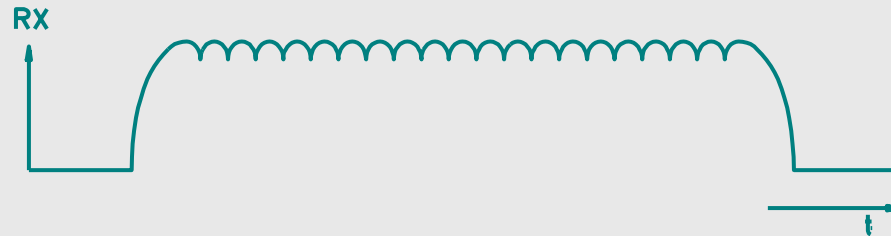
## Single Phase:

soft X-rays that do not contribute to the image



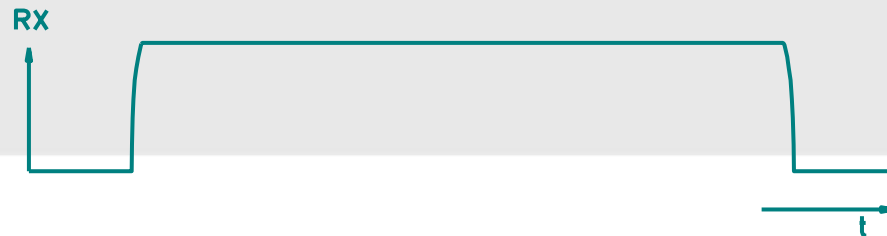
## High Frequency:

better quality X-rays



## Very High Frequency:

minimal dose and perfect image quality





INTRA-ORAL X-RAY UNIT

***ELITYS®***

HIGH FREQUENCY TECHNOLOGY

**INSTALLATION AND MAINTENANCE MANUAL**

This manual must remain on the site of the installation

**CAUTION**

**Federal law restricts this device to sale by or  
on the order of a dentist.**

Trophy Radiology constantly strives to improve its products and, therefore, reserves the right to deliver, without prior notice, machines whose characteristics differ from those described here; nonetheless, these machines are still guaranteed to comply with regulations in force. All rights reserved.

# Contents

<b>I. GENERAL CHARACTERISTICS</b>	<b>1</b>
1. TECHNICAL CHARACTERISTICS ACCORDING TO IEC STANDARD 601-2-7	5
2. MAIN CHARACTERISTICS OF THE X-RAY GENERATOR	7
<b>II. PRIOR TO INSTALLATION</b>	<b>9</b>
1. PACKING	10
2. EQUIPMENT AND TOOLS NEEDED FOR INSTALLATION (not supplied)	11
3. REQUIRED MECHANICAL SPECIFICATIONS	11
4. REQUIRED ELECTRICAL SPECIFICATIONS	12
5. PREPARATION OF THE ROOM	12
<b>III. INSTALLATION</b>	<b>13</b>
1. PREPARATION FOR INSTALLATION	14
1.1. PRELIMINARIES	14
1.2. FRAMEWORK ORIENTATION DOWNWARD OR TO THE LEFT	14
2. MECHANICAL INSTALLATION OF THE X-RAY UNIT	15
2.1. WALL FRAMEWORK	15
2.2. EXTENSION ARM	16
2.3. SCISSOR ARM	17
2.4. GENERATOR	18
2.5. INSTALLING THE BRAKE	18
2.6. MECHANICAL ADJUSTMENTS	19
2.6.1. Adjustment of the arm's horizontality	19
2.6.2. Adjusting the arm drift	19
2.7. INSTALLATION WITH "REMOTE TIMER" OPTION	20
2.8. INSTALLATION WITH "REMOTE EXPOSURE SWITCH" OPTION	22
2.9. INSTALLATION WITH "REMOTE EXPOSURE SWITCH" AND "REMOTE TIMER" OPTIONS	23
2.10. INSTALLATION WITH TWO "REMOTE EXPOSURE SWITCH" OPTIONS IN SERIES	24
3. ELECTRICAL INSTALLATION	25
3.1. ELECTRONICS BOARD CONFIGURATION	25
3.2. ELECTRONICS BOARD INSTALLATION	25
3.2.1. Mechanical installation	25
3.2.2. Wiring	27
4. END OF INSTALLATION	29

<b>IV. SETTING TO WORK</b>	<b>31</b>
1. CHECKING THE MAINS VOLTAGE	33
2. CHECKING THE mA	33
3. HAND-HELD TIMER INITIALIZATION	34
<b>V. PREVENTIVE MAINTENANCE</b>	<b>35</b>
1. CLEANING	36
2. CHECKING	36
2.1. GENERATOR	36
2.2. FIXING THE COMPLETE UNIT TO THE WALL	36
2.3. FLEXIBLE MOVEMENT	36
2.4. HAND-HELD TIMER AND ELECTRICAL INSTALLATION	36
2.5. FUNCTIONING	37
2.6. SELF-TEST	37
<b>VI. CORRECTIVE MAINTENANCE</b>	<b>39</b>
1. MAIN COMPONENTS	41
1.1. CONNECTORS	41
1.2. JUMPERS	41
1.3. LEDS	41
1.4. FUSES	41
1.5. HAND-HELD TIMER DIPSWITCHES	42
2. DIAGNOSIS	42
2.1. TIMER SELF-TEST	42
2.2. ERROR MESSAGES	43
2.3. CANCELLING THE DIFFERENT ERROR MESSAGES	43
3. TROUBLE-SHOOTING HINTS	43
4. PROCEDURE FOR CHANGING THE GENERATOR'S POWER SUPPLY CABLE	45
5. GENERATOR REPLACEMENT	49
6. ARM STABILITY	51
7. FLEXIBILITY ADJUSTMENT OF THE ARM MOVEMENT	51
8. FRONT JACK REPLACEMENT	52
<b>VII. SPARE PARTS LIST</b>	<b>53</b>
<b>VIII. APPENDIX</b>	<b>59</b>

Original language of document: FRENCH

**NOTE TO THE USER**

You have just purchased a TROPHY **ELITYS**® intra-oral X-Ray system. We congratulate you on your choice, and are sure you will be fully satisfied with its use and diagnostic capabilities.

TROPHY X-Ray units offer high quality and advanced technology.

We recommend reading the user's manual carefully before using your unit, to become familiar with its operation and make the most of its performance.

Keep this manual in a safe place so that you can easily refer to it in the future.

Thank you for placing your confidence in TROPHY.

**NOTE TO THE INSTALLER**

The installer must:

- > follow the installation procedure described in this manual when installing the TROPHY X-Ray unit.
- > provide all explanations required on use of the TROPHY X-Ray unit, following the instructions given in the user's manual.
- > return a correctly completed guarantee slip to TROPHY so that the TROPHY 2-year guarantee on the complete unit and 10-year pro rata-temporis guarantee on the generator are valid; otherwise the guarantee will start at the date of manufacture.



## WARRANTY CONDITIONS

It is the responsibility of the user to comply with current legislation concerning installation and operation of the equipment.

In the event of incorrect use or defective maintenance not complying with the recommended scheme, TROPHY RADIOLOGY or its representative shall not be liable for any deficiencies, physical damage, personal injuries or non conformity that may occur as a result.

The equipment must not be used if electrical, mechanical or radiation protection components are defective, or if the operations stipulated by the maintenance programme have not been carried out.

Only TROPHY RADIOLOGY or third parties duly authorized by TROPHY RADIOLOGY may carry out modifications or add extensions to the installation and equipment.

Such modifications shall always be carried out in compliance with the regulations in force in the country of operation, and in compliance with normal trade practice.

If the power supply characteristics do not comply with the recommendations given in section 4 Chapter II "Prior to installation", the **ELITYS®** unit will not be able to provide maximum performance, and it will not be possible to guarantee normal operation.

You can obtain a complete technical file about the **ELITYS®** unit by simply requesting it from TROPHY RADIOLOGY.

## TRANSPORTATION CONDITIONS

The goods are transported at the consignee's risk.

Any disputes as to losses or damage occurring during transportation must be stated in the presence of the haulier upon delivery, and must be noted on the delivery slip.

Under no circumstances shall packaging materials manufactured by TROPHY RADIOLOGY be used for any other purposes than transportation.

## SAFETY AND PROTECTION

X-Rays are not innocuous and can be dangerous if used badly. You must, therefore, take precautions even when following the instructions in this manual.

To install the machine you will need to emit radiation to check that the X-Ray unit is functioning.

Whenever an operation comprises emission of X-Rays, the relevant paragraph will be identified with the sign opposite to remind you to take the usual precautions required in your country.



The signs "Warning" and "Ionising radiation" fixed to the front panel of the hand-held timer mean "WARNING IONISING RADIATION".



X-Ray units manufactured by TROPHY comply with the strictest safety standards in force throughout the world (Europe, Japan, USA, etc.). They guarantee optimum protection against radiation risks.

Nonetheless, you are handling a unit specifically designed to generate X-Rays to allow medical diagnosis on a film or using RVG (a dental digital imaging system). Consequently, despite the inherent safety of our equipment, we recommend using conventional commercially-available equipment to protect yourself and your patient against scattered radiation risks.

In addition, it is vital that the assembly, extensions, adjustments, modifications and repairs be carried out by an authorised TROPHY distributor. Also, your X-Ray unit must be installed in premises that comply with IEC provisions or all local and national codes that apply.

In the event of failure to comply with these instructions TROPHY shall not be held responsible for the safety, reliability and characteristics of the machine.

Your distributor will be pleased to help you with the initial use of your unit and to answer any subsequent questions you may have.

A connection has been provided making it possible to indicate the machine is ready in a location away from the control position, in compliance with standards in force. To do this, connect a 110 V or 230 V bulb (depending on the country) to terminals 8 and 7 of the "MAIN PWR" connector.



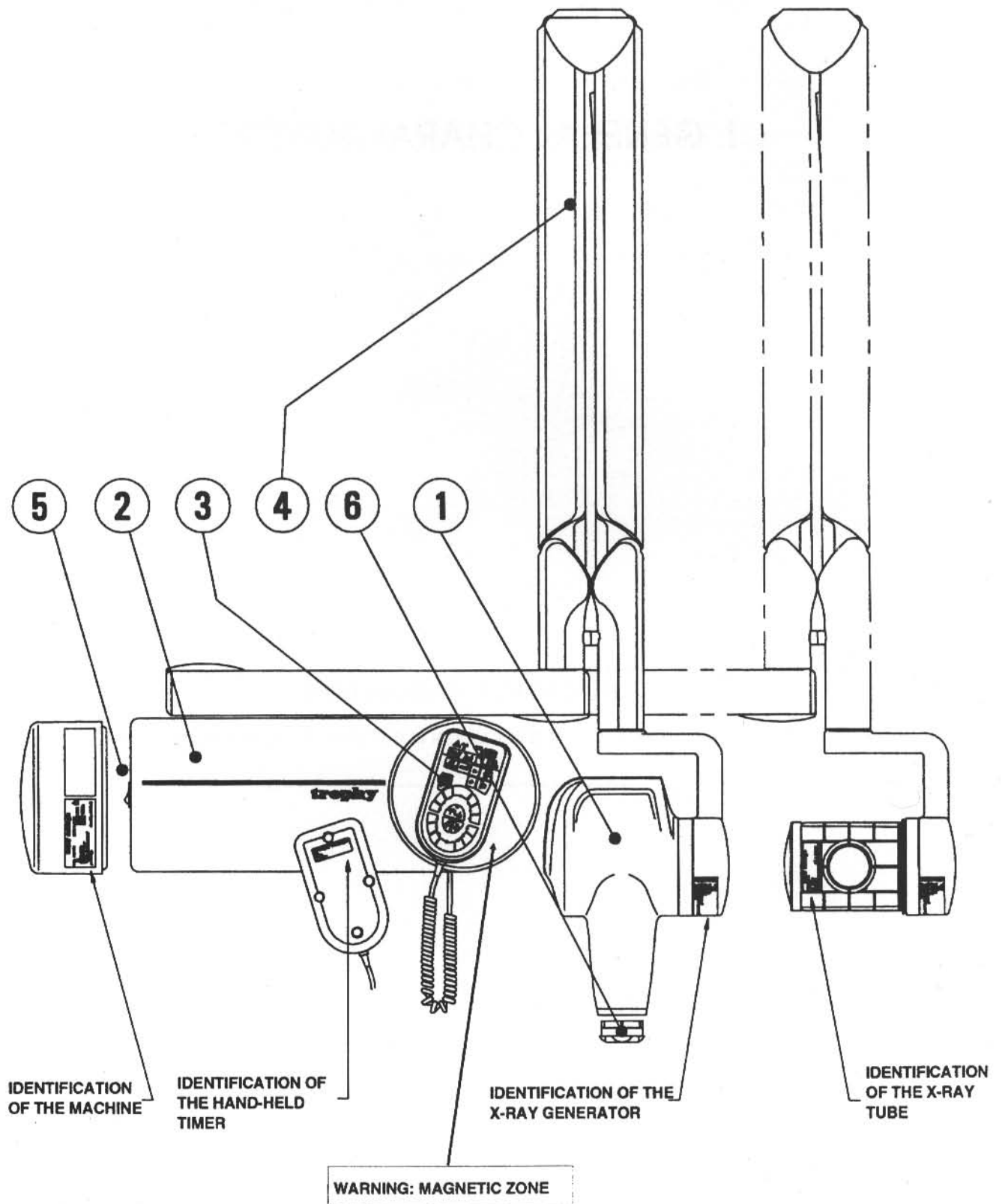
## **I. GENERAL CHARACTERISTICS**

---

### **IMPORTANT INFORMATION**

The TROPHY X-Ray unit described in this manual is designed for wall-mounted installation.

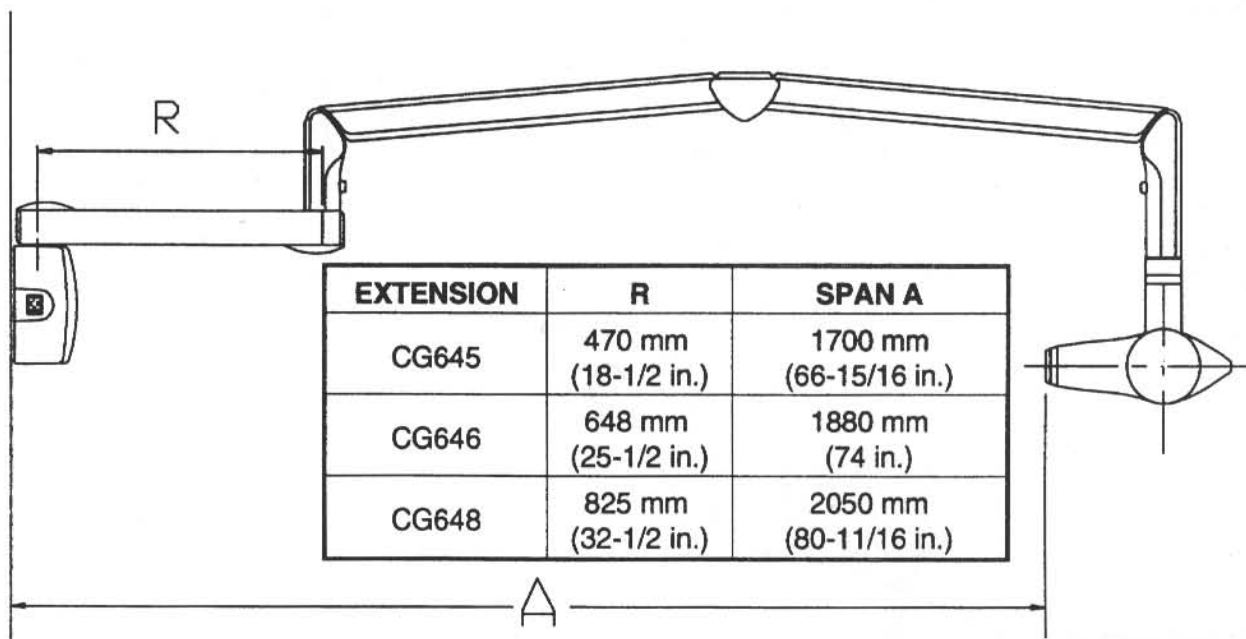
---



Your intra-oral X-Ray unit is made up of:

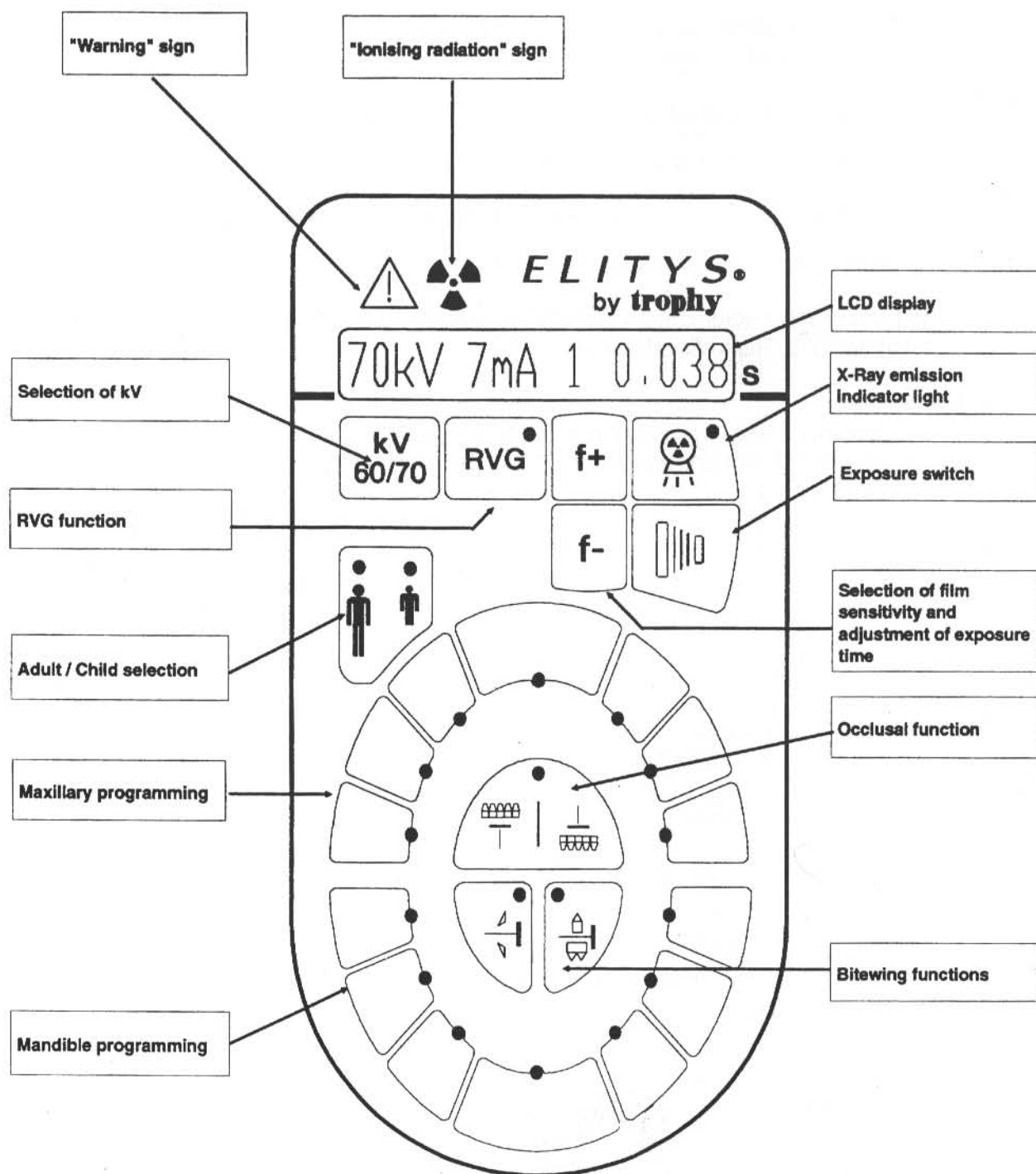
- ① A high frequency X-Ray generator comprising:
  - > a transformer and associated electronics, and an oil-bathed X-Ray emitting tube
  - > a beam limiting device that limits radiation to a diameter of approximately 6 cm (2-3/8 in.) on the skin and ensures a distance of 20 cm (7-7/8 in.) between the skin and the X-Ray focal spot.
  - > an angle scale and a handle to facilitate positioning
- ② A wall framework containing the high frequency generator's control electronics designed to support its mechanical stand.
- ③ A hand-held timer for the X-Ray generator, with the following features:
  - > anatomical selection and digital display of parameters (kV, mA, exposure time)
  - > a self-test of the microprocessor each time the unit is activated
  - > an alarm in the event of incorrect operation
  - > an RVG key that automatically adjusts the exposure parameters (time and mA) if you are using an RVG (RadioVisioGraphy)
- ④ A scissor arm:
 

The scissor arm makes it possible to position the generator easily and precisely. It is wall-mounted with an extension arm of 470 mm (18-1/2 in.), 648 mm (25-1/2 in.) or 825 mm (32-1/2 in.).



- ⑤ On/off switch with built-in light

- ❑ Options
  - Remote timer
  - Remote exposure switch
  - Rectangular collimator ⑥ , dimensions 41 x 32 mm (1-5/8 x 1-1/4 in.).



## 1. TECHNICAL CHARACTERISTICS ACCORDING TO IEC STANDARD 601-2-7

### Manufacturer

TROPHY RADIOLOGIE  
4, rue F. Pelloutier  
Croissy-Beaubourg  
77437 MARNE-LA-VALLÉE Cedex 2 - FRANCE

### Models

Dental X-Ray diagnosis devices, class 1, type B, intermittent use.

**ELITYS®-TR**: equipped with tube TRX 708 from TROPHY RADIOLOGIE

**ELITYS®-C**: equipped with tube OCX / 65-G from CEI

### Electric power supply

230 - 240 V AC ( $\pm 10\%$ ), 50 Hz, 5 A, apparent resistance 0,5  $\Omega$

100 - 110 - 130 V AC ( $\pm 10\%$ ), 50/60 Hz, 10 A, apparent resistance 0,2  $\Omega$

### Rated high voltage and maximum corresponding current

- film mode	70 kV, 7 mA
- RVG mode	70 kV, 4 mA

### Current/voltage combinations for a maximum output power of

- 490 W in film mode	70 kV/7 mA
- 280 W in RVG mode	70 kV/4 mA

### Rated power for exposure time of 0.1 s

- film mode	490 W
- RVG mode	280 W

### Rate of use

At 70 kV, 7 mA and 0.1 s and at the maximum tank temperature; one exposure every 8 seconds.

### Minimum value of the current/time product in the range of conformity:

0.14 mAs at 7 mA  
0.08 mAs at 4 mA

### Selection of parameters

- film mode	70 kV / 7 mA 60 kV / 7 mA
- RVG mode	70 kV / 4 mA 60 kV / 4 mA



**Area of conformity to the IEC standard 601-2-7**

- Reproducibility of the emitted radiation conform
- Linearity of the emitted radiation conform
- Precision in radiography conform

**Measurement conditions**

- kV: direct measurement using the resistance chain voltmeter method (divider bridge)
- mAs: direct measurement in the circuit using the mAsmeter
- Exposure time: direct measurement on the kV signal at 75% of the peak value

**Dimensions and weight**

Hand-held timer	16 x 9 x 4 cm (6-5/16 x 3-1/2 x 1-9/16 in.)	0.4 kg (0.88 lbs)
Wall framework	51.4 x 18.9 x 10.8 cm (20-1/4 x 7-7/16 x 4-1/4 in.)	5.2 kg (11.46 lbs)
X-Ray generator	43.8 x 22.6 x 12 cm (17-1/4 x 8-15/16 x 4-3/4 in.)	4 kg (8.82 lbs)
Scissor arm	87.3 x 13.3 x 6.3 cm (34-3/8 x 5-1/4 x 2-1/2 in.)	7.2 kg (15.87 lbs)

**Scissor arm**

The scissor arm is equipped with gas jacks specially designed for this particular application.

They have been proved to function correctly after more than 400,000 cycles.

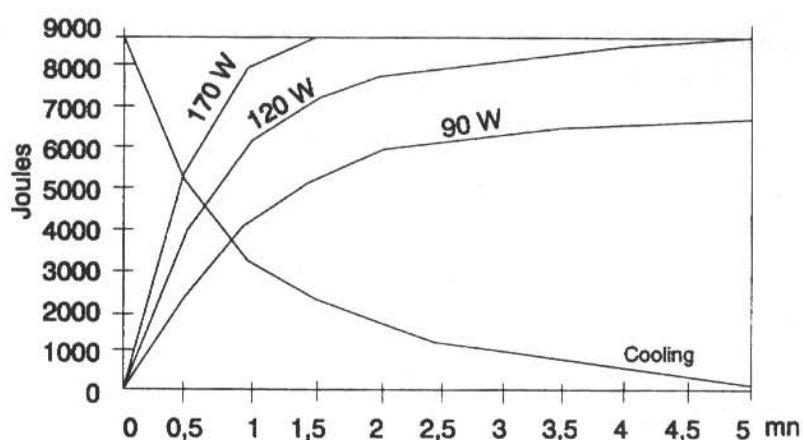
**EC conformity marking**

The **ELITYS®** X-Ray generator complies with the European directive on electro-magnetic compatibility 89/336/EEC. The EC marking on the machine refers only to this directive.

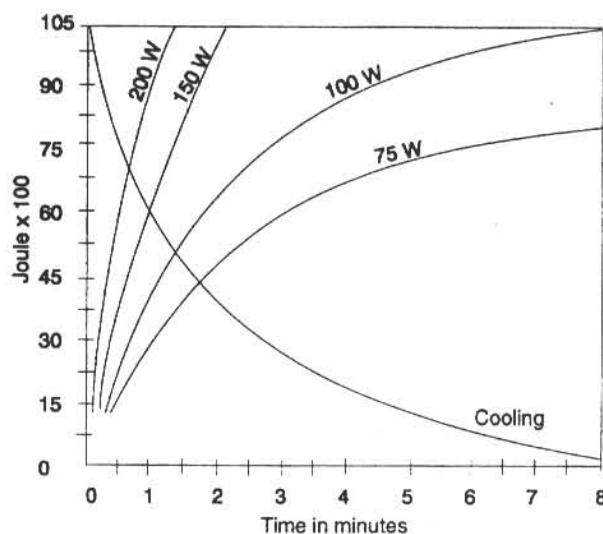
## 2. MAIN CHARACTERISTICS OF THE X-RAY GENERATOR

Manufacturer and type of X-Ray tube	TROPHY Type TRX 708	CEI Type OCX / 65-G
Rated high voltage	70 kV	70 kV
Rated anodic power	490 W	490 W
Maximum heat accumulated in the anode	8 700 J	10 000 J
Rated value of focal spot (IEC 336/1982)	0,7 mm (.027 ")	0,7 mm (.027 ")
Reference axis for the slope of the target and indicated characteristics of the tube's focal spot	see drawing	see drawing
Target materials	Tungsten	Tungsten
Target slope	19 °	19 °
Filtration due to fixed materials	0,6 mm (.023 ") eq. Al	0,6 mm (.023 ") eq. Al

GENERAL CHARACTERISTICS



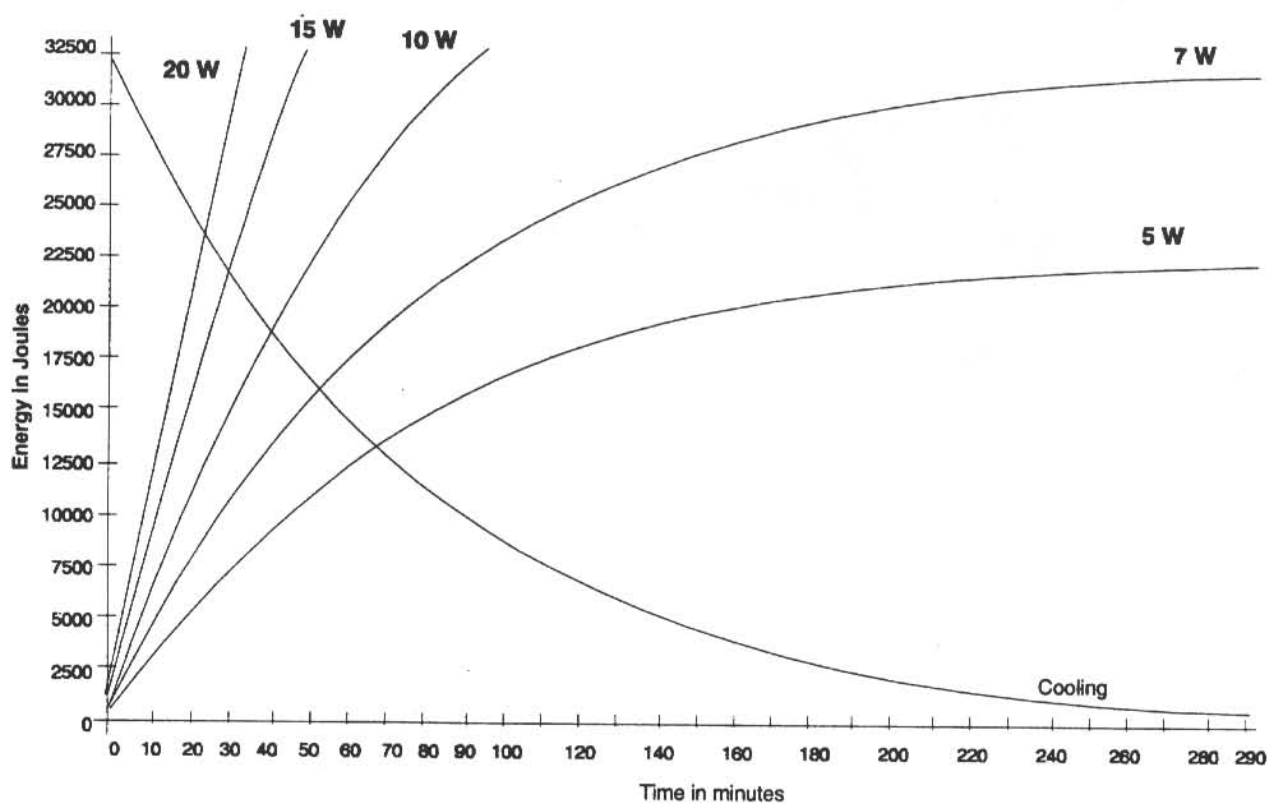
TROPHY tube type TRX 708



CEI tube type OCX / 65-G

**Equipped X-Ray generator**

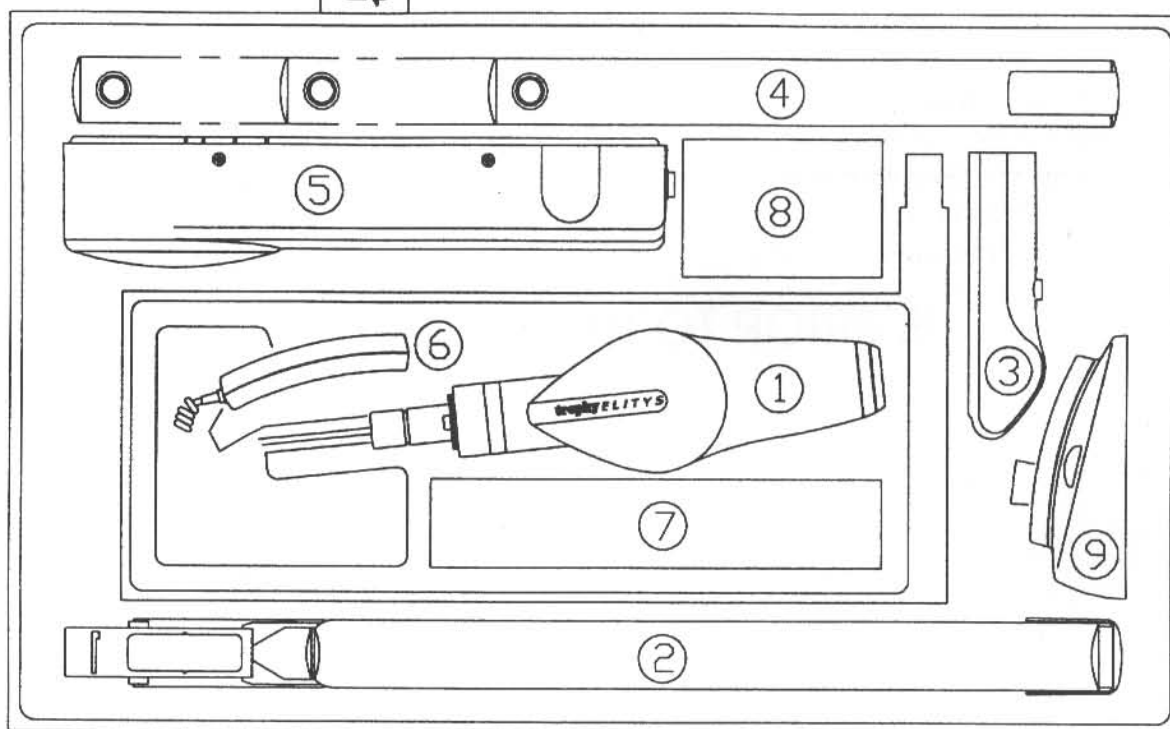
IEC standard 601-2-28	Conform
Type of protection against electric shocks	Class I
Degree of protection against electric shocks	Type B
Rated value of inherent filtration	1.5 mm (.059 ") eq. Al
Rated value of additional filtration	1.0 mm (.039 ") eq. Al
Rated value of total filtration	2.5 mm (.098 ") eq. Al
Beam limiting cone, focal spot/skin distance	20 cm (7-7/8 in.)
Maximum accumulated heat	32 500 J
Maximum continuous thermal dissipation	20 W
Leaking radiation for continuous operation at 490 W for one hour (IEC 407/1973)	< 0,25 mGy
Maximum field of symmetrical radiation	6 cm (2-3/8 in.) diameter



Heating and cooling curves of the **ELITYS®** tank

## **II. PRIOR TO INSTALLATION**

PRIOR TO  
INSTALLATION

**1. PACKING**

Box dimensions (L x W x H): 1000 x 600 x 300 mm (39-3/8 x 23-5/8 x 11-13/16 in.).

The TROPHY X-Ray unit comprises the following components arranged in special expanded polystyrene packing to guarantee complete protection during transport, as shown on the above diagram.

Nº	DESCRIPTION
1	Complete generator
2	Scissor arm with generator cable
3	Plastic covers for the scissor arm
4	Extension arm Length: 470 mm (18-1/2 in.), 648 mm (25-1/2 in.) or 825 mm (32-1/2 in.) as specified in the order
5	Wall framework
6	Hand-held timer
7	Power board
8	Accessories: brake for pivot, brake for arm, and so on
9	Option: remote timer


## 2. EQUIPMENT AND TOOLS NEEDED FOR INSTALLATION (not supplied)

- 1 Multimeter with range 300 V~ 1% and 30 V= 1%, internal resistance greater than 100 k $\Omega$
- 1 Tape measure
- 1 7 mm socket wrench
- 1 Set of metric Allen keys
- 1 Spirit level
- 1 Plastic mallet
- 1 Impact drill with a set of drill bits from 3 to 13 mm (.12 to .51 in.)
- 1 Small screwdriver (3 mm) (.12 in.) for electrical connections
- 1 Medium screwdriver
- 2 measurement wire grips
- Three-wire mains power supply cable (2 conductors + earth). Recommended cross-section 1,5 mm<sup>2</sup> (14AWG), length not exceeding 8 metres (8.75 yd.) in 100-130 V and 16 metres (17.5 yd.) in 230-240 V. For greater lengths, use a cable with bigger cross-section corresponding to regulations in force in the country concerned.

To mount the wall framework:

- Provide mounting tools suitable for the type of wall concerned (see "Required mechanical specifications" below).

## 3. REQUIRED MECHANICAL SPECIFICATIONS

 **WARNING:** The TROPHY X-Ray unit must be installed such that it is impossible to rotate the scissor arm through 360°. Otherwise, the power supply cable can fail and cause electrical damage.

The wall framework which carries the X-Ray unit must be strongly attached to the wall. Choose an attachment system suitable for the type of wall and capable of withstanding a tear-off force of **147 kg (324 lbs)** per anchor point.

Check that the wall is plumb to avoid any drift in the arm position. Use spacers if the wall surface is far from plumb.

#### 4. REQUIRED ELECTRICAL SPECIFICATIONS

A dedicated three-wire electrical line protected by a 15 A breaker (D curve) and a differential of 30 mA from the electrical meter must be provided.

A power supply line generally consists of a three-wire cable (2 conductors + earth). The minimum cross-section is 1.5 mm<sup>2</sup> (14AWG) and the wire colours and characteristics correspond to each country's electricity regulations. The maximum lengths are 8 m (8.75 yd.) in 100-130 V and 16 m (17.5 yd.) in 230-240 V. For greater lengths the cross-section will be increased in proportion, e.g. 3 mm<sup>2</sup> (12AWG) for a length of 32 m (35 yd.) in 240 V.

The line's apparent resistance must be less than or equal to 0.2  $\Omega$  in 110-130 V and 0.5  $\Omega$  in 230-240 V.

The X-Ray unit must have a fixed connection to the electrical power supply network.

Rated voltage (off-load)	Minimum	Maximum	Maximum line current
100 V, 110 V, 130 V	90 V	144 V	10 A
230 V, 240 V	180 V	288 V	5 A

---

#### IMPORTANT

The maximum line current is obtained by following the instructions for connecting the generator's power supply cable (see Chapter III section 3.2.2 page 27).

The maximum on-load voltage variation on the line must be important no more than 3%.

---

**⚠ WARNING:** *If other appliances are installed on the same line, interference and voltage variations may cause your X-Ray unit to function abnormally.*

#### 5. PREPARATION OF THE ROOM

Compliance with all national and local codes, as well as TROPHY's specification (given above in section 3 and 4), is mandatory in regards to high and low voltage wiring.

The Appendix (page 59) shows layout and dimension plans for a hypothetical room.

### III. INSTALLATION

---

#### IMPORTANT INFORMATION

- ☞ *To install the machine with a remote timer, refer to section 2.7.*
  - ☞ *The machine is supplied with the wall framework oriented to the right for a standard installation.*
-



## 1. PREPARATION FOR INSTALLATION

### 1.1. PRELIMINARIES

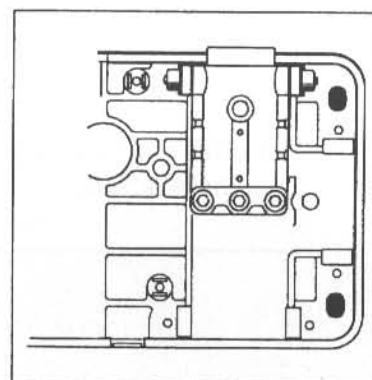
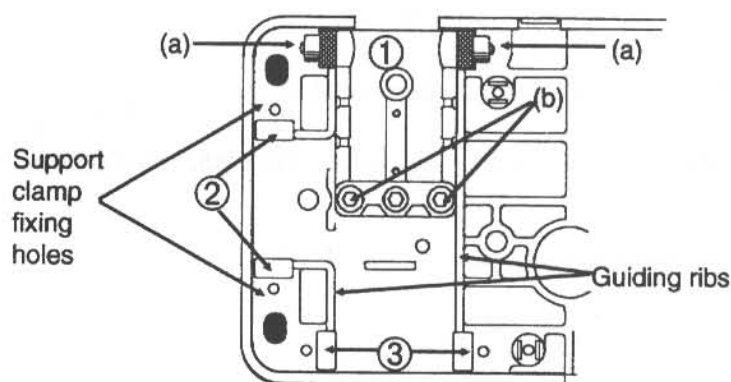
Only qualified technicians are authorised to install the TROPHY X-Ray unit, and it must be installed in compliance with the instructions for mechanical and electrical installation defined below.

Regardless of the type of installation, the hand-held timer must be installed so that the patient and the selected parameters can be seen from the point of operation.

**CAUTION:** Make sure that the various cables required for installation have been put in place. Check that the voltage shown on the label of your generator corresponds to the mains voltage provided by your electrical power supply. Check that the position of the jumpers on the wall framework's power board corresponds to the mains voltage, see section 3.1, page 22.

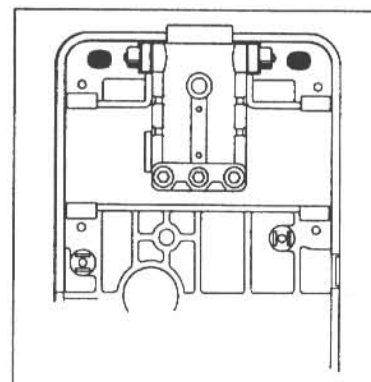
### 1.2. FRAMEWORK ORIENTATION DOWNWARD OR TO THE LEFT

- ☐ Remove the pivot arm support from its position ① using a 6 mm Allen key to remove the two Socket Head Cap screws serving as an axis (a), and then the two fixing screws (b).



**Framework to the left**

- ☐ Remove the support clamp using a 4 mm Allen key and take the clamp out through the back of the framework.
- ☐ Put the clamp back, passing it through the back of the framework in the openings corresponding to the orientation of the wall framework:
  - ② : framework oriented downwards
  - ③ : horizontal framework oriented to the left
- ☐ Position the pivot arm support in the clamp so that it is held securely by the guiding ribs.
- ☐ Fix the clamp with its two screws. Tighten firmly.
- ☐ Fix the arm support with its axis screws (a) and the other two screws (b).
- ☐ Tighten gently.

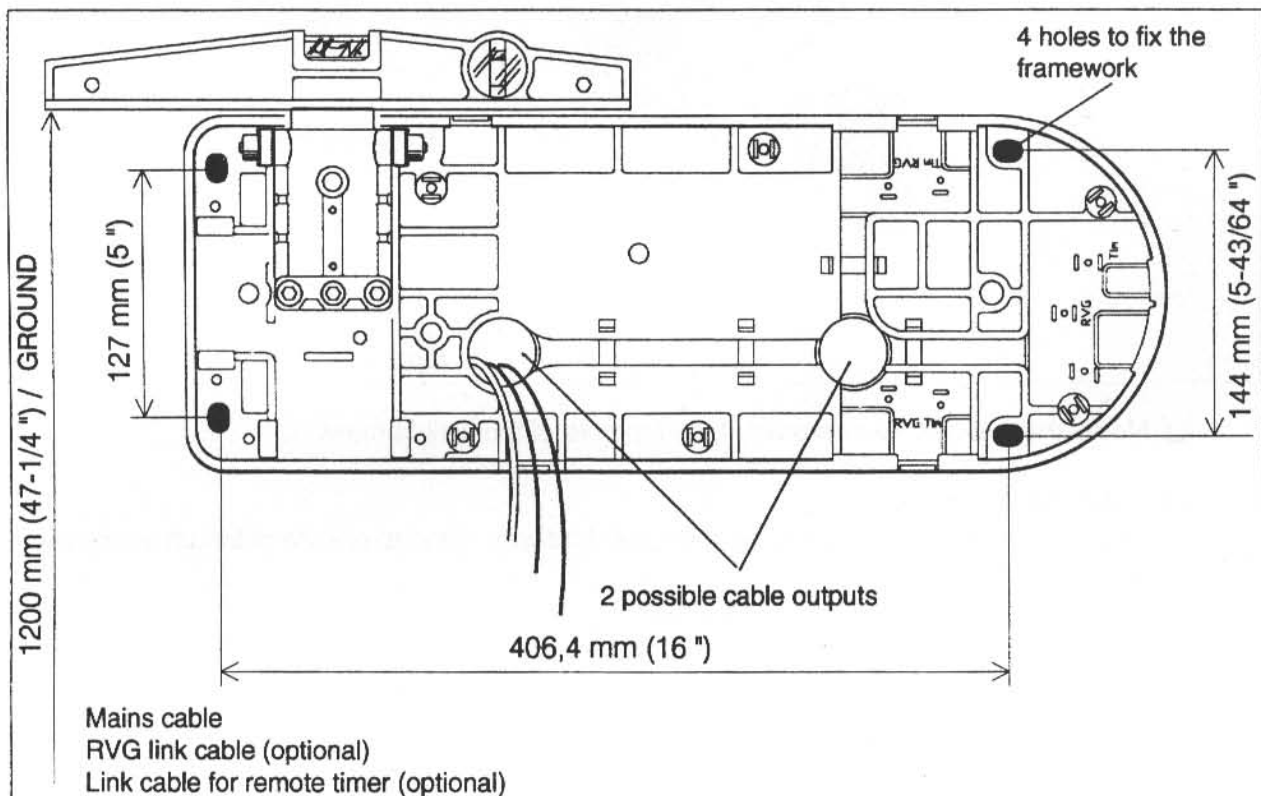


**Framework downward**

## 2. MECHANICAL INSTALLATION OF THE X-RAY UNIT

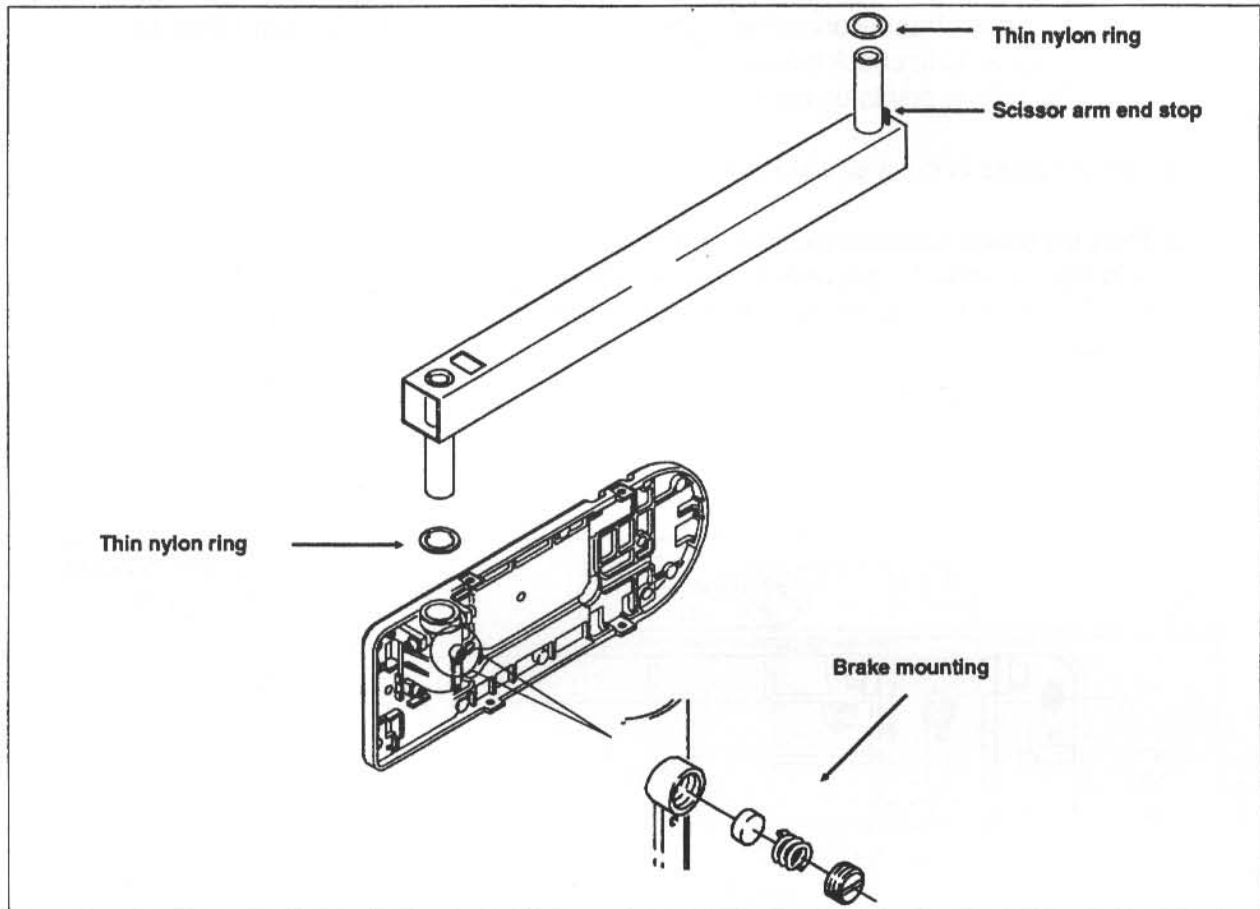
### 2.1. WALL FRAMEWORK

- ❑ Unpack the wall framework.  
Remove the gray insulator from chassis, and save for later.  
It is advisable to install the top of the framework approximately 1.20 m (47-1/4 in.) above the floor.
- ❑ Position the wall framework at the required point with its chosen orientation (see section 1.2).  
Use a spirit level to check it is horizontal.  
Mark the 4 fixing points on the wall.
- ❑ Drill the holes in the wall and install the fixing system chosen according to the type of wall.
- ❑ Pass the power supply cable through the hole in the framework, as well as the RVG link cable and the link cable for the remote timer if necessary.  
Fix the framework to the wall, and if necessary insert shims to ensure the installation is vertical.
- ❑ Screw and tighten using force, having first checked the wall framework is perfectly vertical and horizontal.



## 2.2. EXTENSION ARM

- ☐ Check each pivot of the extension arm is fitted with a thin nylon ring.
- ☐ **DO NOT LUBRICATE THE PIVOTS.** The scissor arm and the wall framework are fitted with self-lubricating rings.
- ☐ **WARNING:** Install the extension arm correctly, with the stop at the scissor arm end.



- ☐ Mount the extension arm's pivot in the top hole of the wall framework.
- ☐ Install the pivot's brake kit .  
The parts in this kit must be assembled the right way round to ensure optimum operation of this system.  
Only tighten the screw moderately at first.

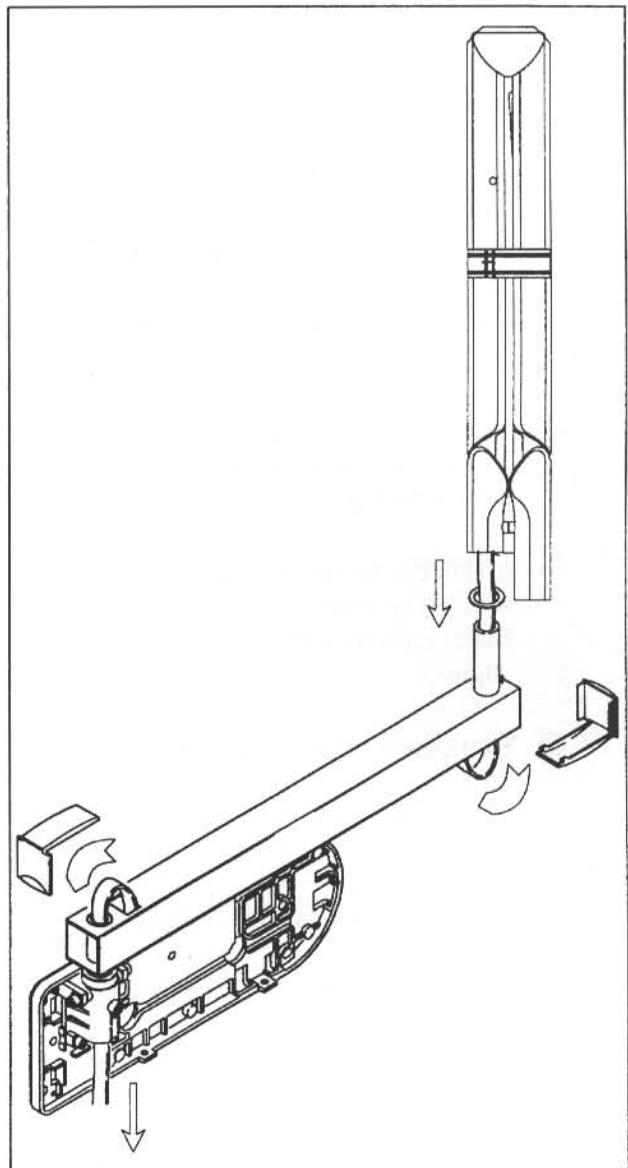
### 2.3. SCISSOR ARM

**WARNING:** Do not loosen the strap holding the scissor arm until the generator has been fixed to it. Otherwise, if the arm suddenly swings back it could be damaged and might injure the operator. The scissor arm has not been designed for use without a generator.



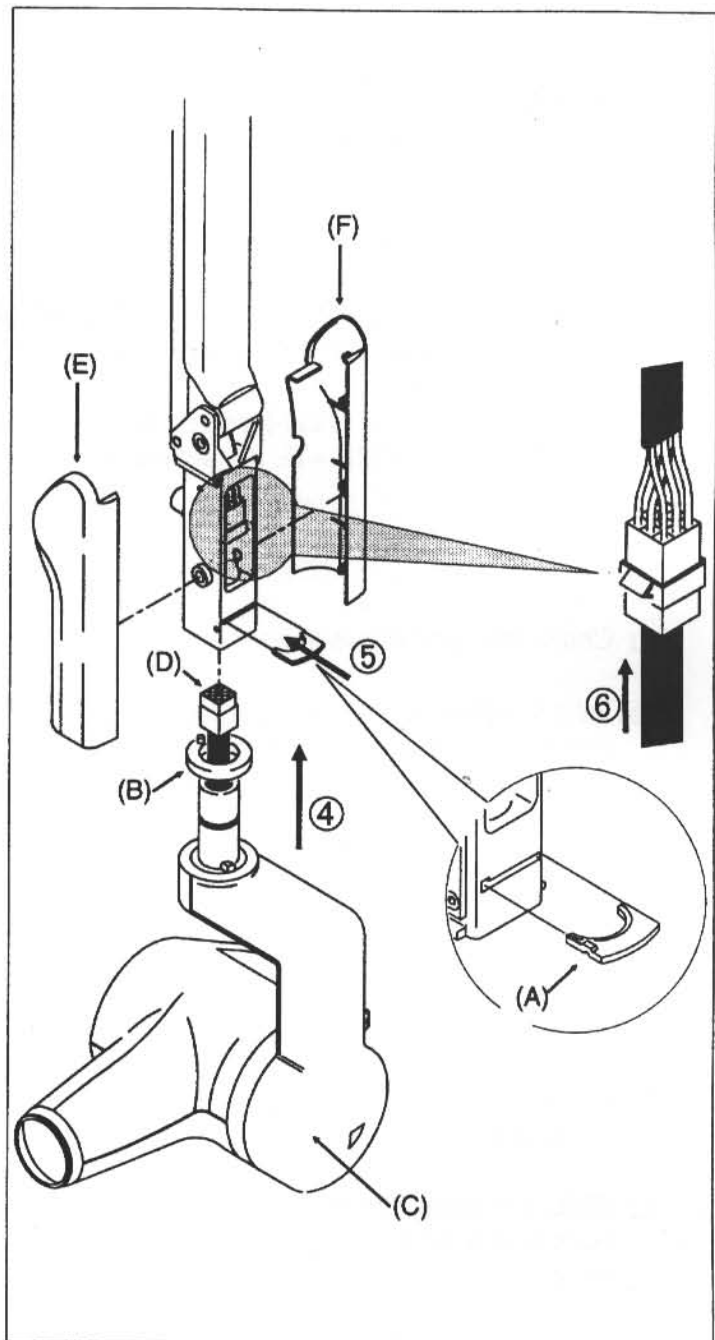
- ❑ The scissor arm ring is self-lubricating, and so THERE IS NO NEED TO LUBRICATE the extension arm pivot.

- ❑ Check the nylon ring is in position.
- ❑ Take the generator's power supply cable coming out of the scissor arm's axis and feed it into the extension arm pivot, bringing it out underneath.
- ❑ Install the scissor arm on the extension arm while sliding the power supply cable.
- ❑ Pass the cable along inside the extension arm using the opening located under the arm and bring it out on the wall side, through the opening located on the top of the extension arm.
- ❑ Slide the cable into the extension arm pivot and bring it out in the wall framework.
- ❑ Install the two covers for the power supply cable on the extension arm, one on the wall framework side, the other on the scissor arm side.



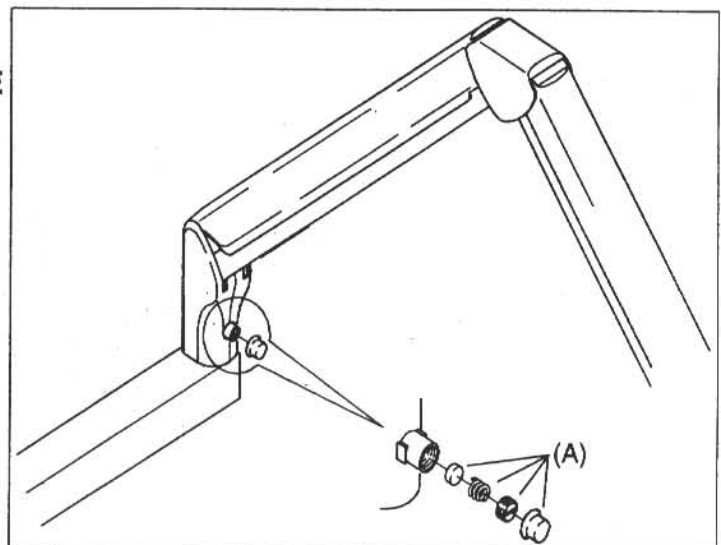
## 2.4. GENERATOR

- ① You will find the generator's blocking key (A) in the accessory box.
- ② Make sure the ring preventing full rotation (B) is in place. Remove all excess grease from tube with paper towel prior to putting connector in place.
- ③ Carry the generator (C) from underneath, with the power supply socket towards the top (D).
- ④ Push upwards until the scissor arm and the generator are in contact.
- ⑤ Keep the generator in this position. Position the blocking key in its slot. You can now let go of the generator.
- ⑥ Insert the plug in the socket located inside the scissor arm and push until they lock together.
- ⑦ Install the two plastic covers (E) and (F) on each side of the arm. Make sure they are properly positioned.
- ⑧ Remove the strap holding the arm.



## 2.5. INSTALLING THE BRAKE

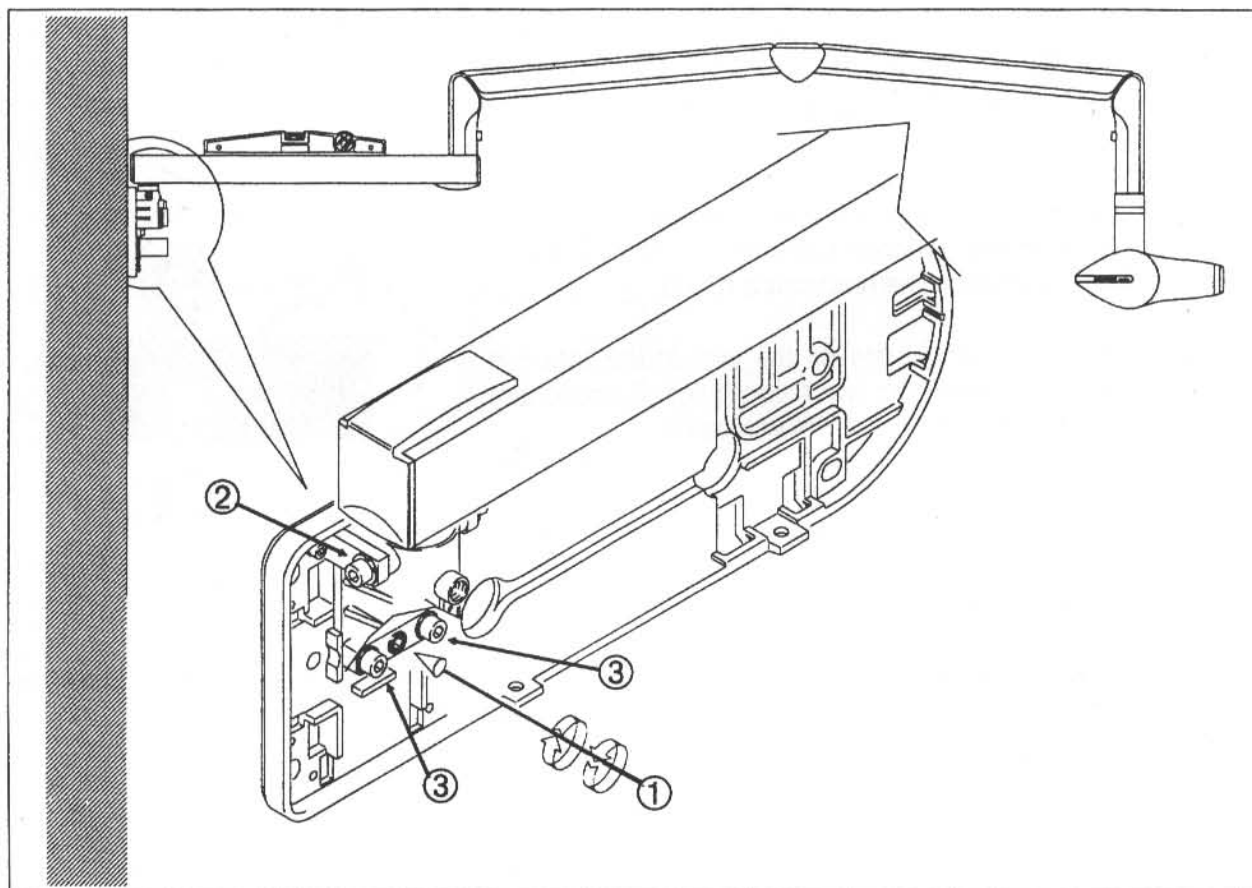
- ① Open the scissor arm slightly to install its brake kit (A).
- ② The parts in this kit must be assembled the right way round to ensure optimum operation of this system. Only tighten the screws moderately at first.



## 2.6. MECHANICAL ADJUSTMENTS

### 2.6.1. Adjustment of the arm's horizontality

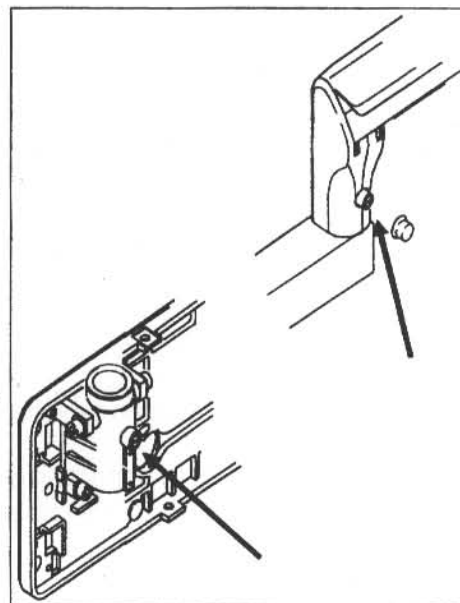
- Extend the arm to its maximum extent perpendicular to the wall framework, and place a spirit level as shown in the figure below.



- Adjust the stop screw ① so that the extension arm is horizontal. Check that whatever position the arm is in, it does not drift.  
If necessary slightly loosen the 2 screws working as an axis ② and the 2 screws ③ in order to facilitate adjustment.
- Tighten the 2 screws ③ without using force, but use force to tighten the axis screws ②.

### 2.6.2. Adjusting the arm drift

- Remove the brake cover on the scissor arm side.
- Adjust the brake to prevent horizontal drift of the arm in all positions, while conserving the flexibility of movement.  
Screw down to prevent drift.  
Unscrew to make the movement more flexible.
- This adjustment should be carried out on both brakes, in the wall framework and on the scissor arm.
- Put back the cover on the scissor arm side.



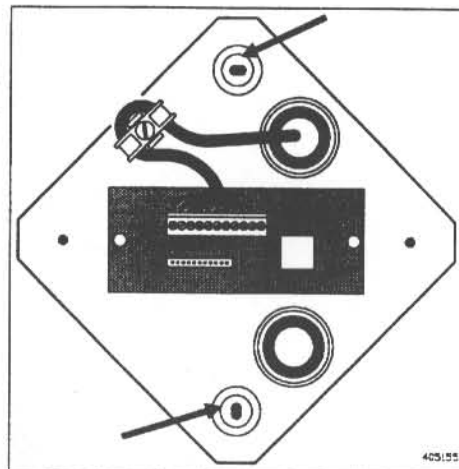
## 2.7. INSTALLATION WITH "REMOTE TIMER" OPTION

□ The kit consists of:

- 1 fixing plate with connection board
- 1 remote stand
- 1 link cable 15 m (16.4 yd.) long for connection to the wall framework
- 1 connection cable 30 cm (11-13/16 in.) long
- Screws, fixing plugs and small tools

□ Pass the link cable into the wall framework or check its position and its connection to the ELITYS CTRL PANEL socket on the electronics board.

- Position the fixing plate on the wall at the required location and mark the two fixing holes. If necessary use a spirit level to check the verticality. Drill the holes and fix the plate securely using the screws and plugs supplied or another method suitable for the type of wall concerned, having first passed the link cable through the corresponding grommet.



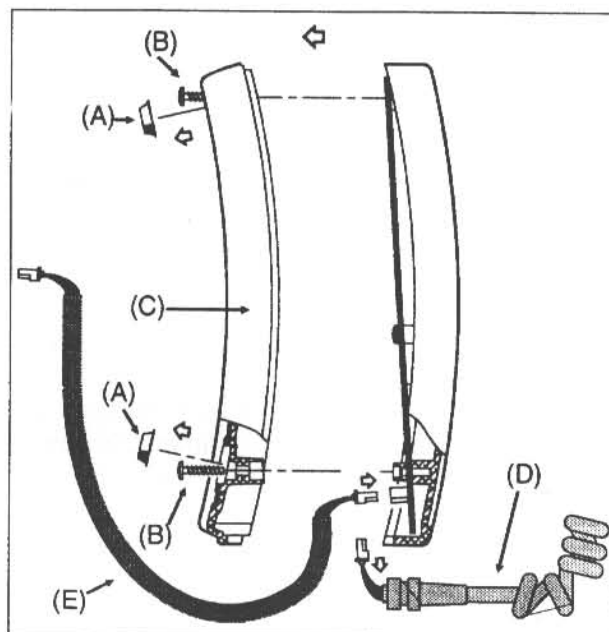
- Connect the link cable wire by wire to the screw terminal block on the connection board, in compliance with the color codes, and fix it in the cable-clamp.

- 1 : orange
- 2 : violet
- 3 : green
- 4 : black
- 5 : grey
- 6 : brown
- 7 : yellow
- 8 : red
- 9 : white
- 10 : blue + shield

10	9	8	7	6	5	4	3	2	1

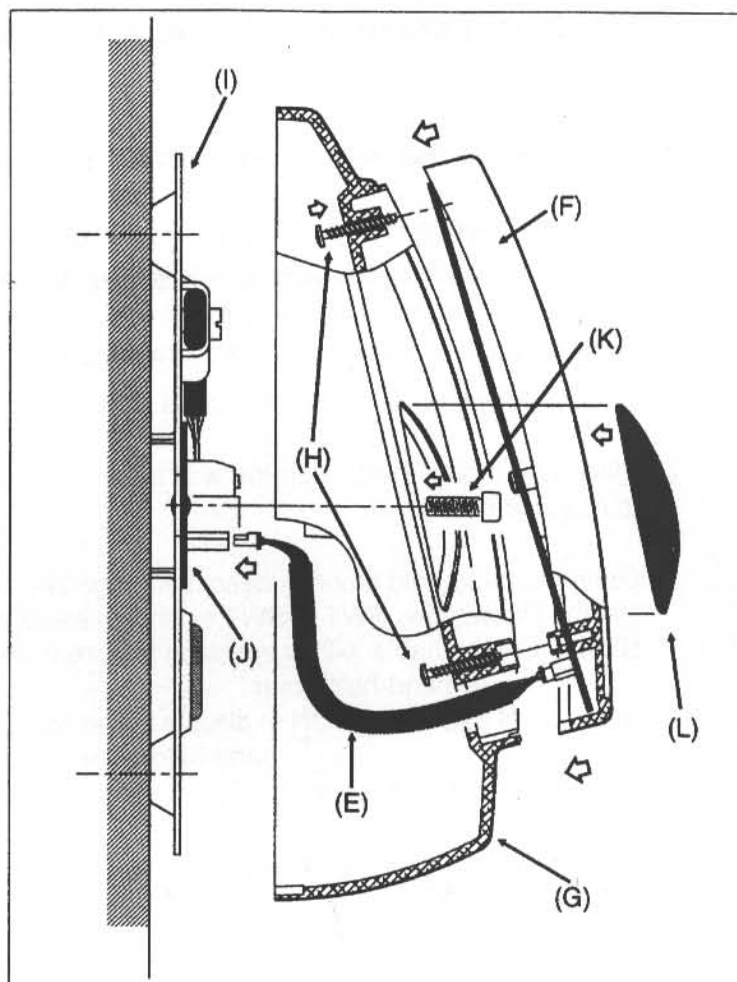
□ Take the hand-held timer.

- Remove the two rubber feet (A) at the back.
- Remove the two screws (B) underneath the feet, that fasten the rear cover (C). Remove the cover.
- Remove the hand-held timer cable (D).
- Replace it by connecting one end of the 30 cm (11-13/16 in.) cable (E).





- ❑ Position the hand-held timer (F) on its stand (G) and pass the other end of the 30 cm (11-13/16 in.) cable (E) through the opening designed for this purpose.
- ❑ Fix the unit on its support using the two screws (H) supplied T45 3 x 22 mm (.12 x .87 in.).
- ❑ Present the support fitted with the unit in front of the fixing plate (I).  
Connect the 30 cm (11-13/16 in.) cable (E) to the connection board (J).  
Fix the support to the plate using the two screws M5-16 (K) supplied.  
Fix the two screw covers (L).





## 2.8. INSTALLATION WITH "REMOTE EXPOSURE SWITCH" OPTION

- ☐ Kit contents
  - 1 remote exposure switch assembly (AD142).
- ☐ Equipment needed
  - 1 2" x 4" recessed electric box, or fixed to wall, matching the switch plate.
- ☐ Pass the exposure cable to the wall framework.
  - Use a shielded 3 x 0,22 mm<sup>2</sup> cable type EHEA.3PR or a 3 stranded cable 24AWG.
- ☐ Place and mount the box on the wall to the desired place and draw the exposure cable up to its cable-clamp.

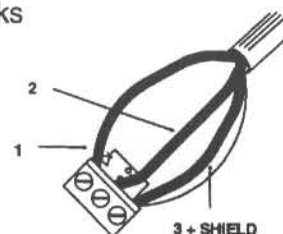
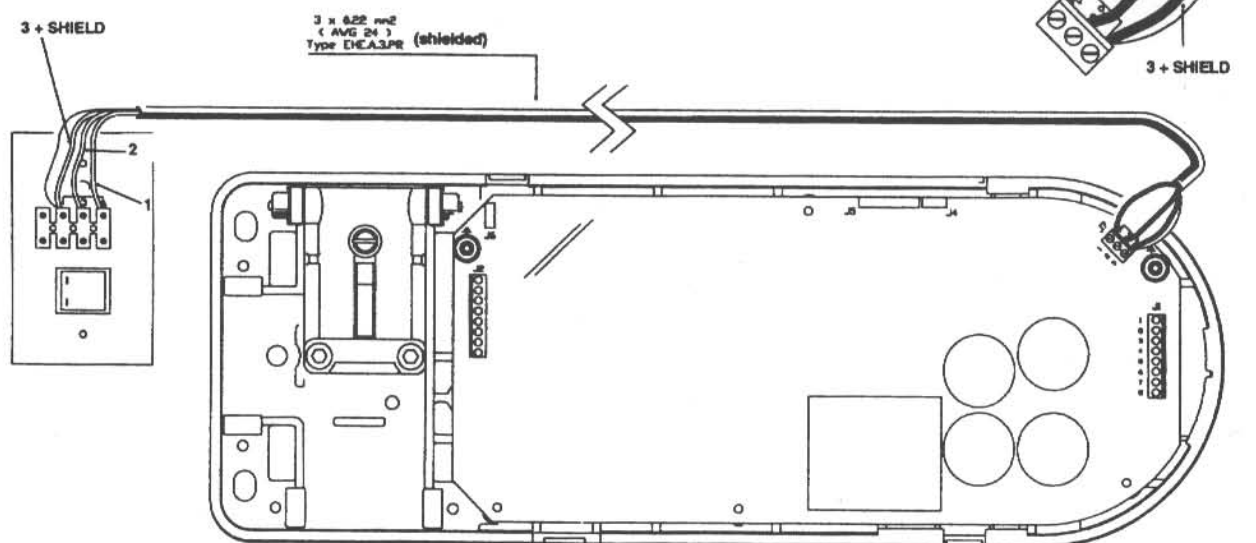
- ☐ Open the hand-held timer as described page 20.  
Set the dipswitches SW1 to SW7 as shown aside:  
SW4 to ON to enable X-Ray emission from remote exposure switch  
or hand-held timer



SW4 to ON and SW5 to ON to disable the exposure switch of the hand-held timer.

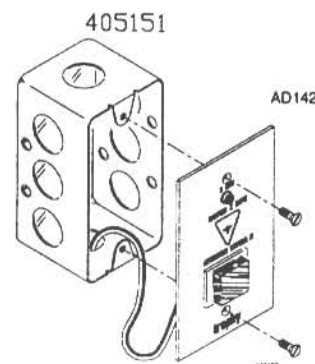
Close the hand-held timer.

- ☐ Connect the exposure cable wire by wire to the screw terminal blocks and fix it in its cable-clamp, see diagram below.



- ☐ Fix the front cover on the electric box using the 2 screws.

**NOTE :** If local codes require disabling of the exposure switch of hand-held timer, do not forget to set SW4 and SW5 to ON.



## 2.9. INSTALLATION WITH "REMOTE EXPOSURE SWITCH" AND "REMOTE TIMER" OPTIONS

### □ Kit contents

- 1 remote exposure switch assembly (AD142)
- 1 remote timer assembly (CG659)

### □ Open the hand-held timer as described page 20.

- Set the dipswitches SW1 to SW7 as shown aside:
- SW4 to ON to enable X-Ray emission from remote exposure switch **or** remote timer.
  - SW4 to ON and SW5 to ON to disable the exposure switch of the remote timer.
  - SW5 to ON to enable X-Ray emission only when remote exposure switch **and** remote timer exposure switch are both activated.



- Close the han-held timer.

### □ Pass the link cable into the wall framework or check its position and its connection to the ELITYS CTRL PANEL socket on the electronics board as described § 2.7.

### □ Pass the exposure cable from the remote exposure switch assembly to the remote timer mount.

Use a shielded 3x0,22 mm<sup>2</sup> cable type EHEA.3PR or a 3 stranded cable 24AWG.

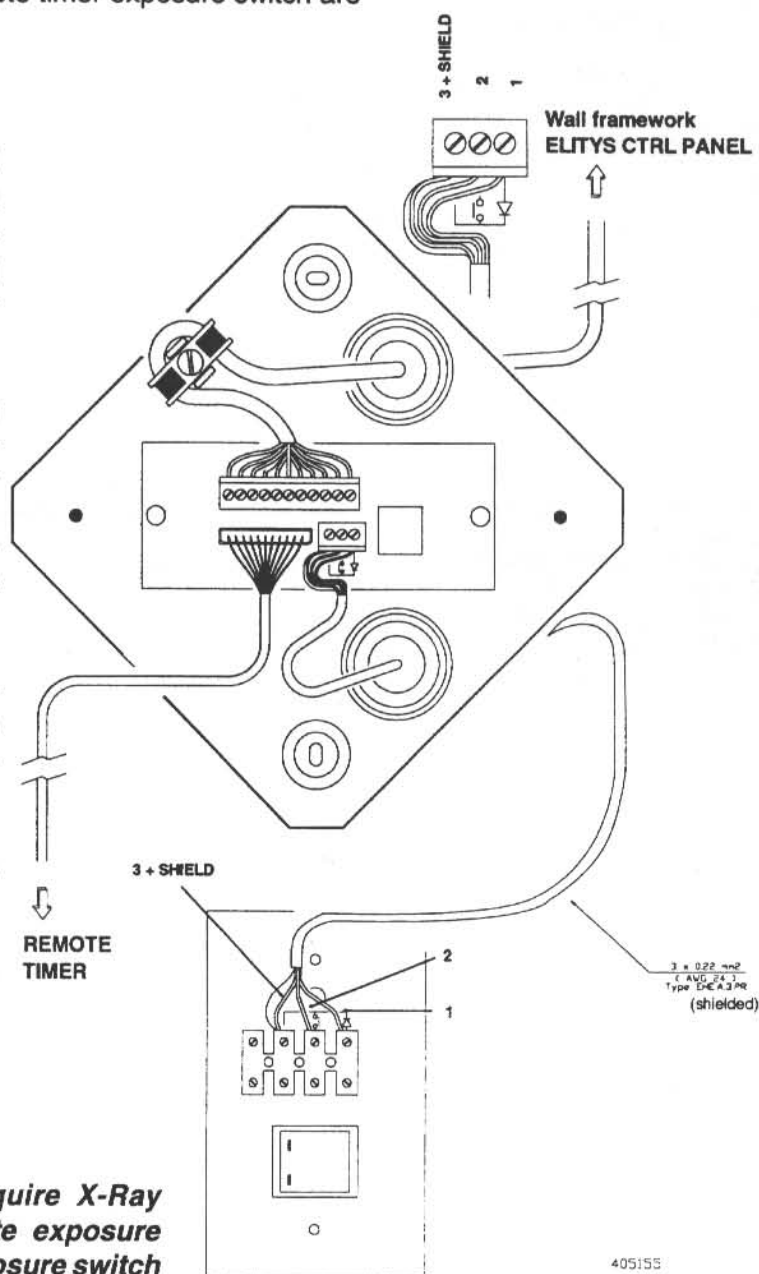
### □ Place and mount the remote exposure switch and the remote timer where needed as described § 2.7. and 2.8.

### □ Connect the remote timer as described § 2.7.

### □ Connect the remote exposure switch and the remote timer as shown adjacent.

### □ Fix the front covers as described § 2.7. and 2.8.

**NOTE :** If local codes require X-Ray emission only when remote exposure switch and remote timer exposure switch are both activated, do not forget to set SW5 to ON.



## 2.10. INSTALLATION WITH TWO "REMOTE EXPOSURE SWITCH" OPTIONS IN SERIES

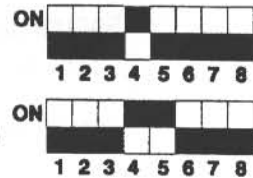
### ☐ Kit contents

- 2 remote exposure switch options (AD142)

### ☐ Open the hand-held timer as described page 20.

➤ Set the dipswitches SW1 to SW7 as shown aside:

- SW4 to ON to enable X-Ray emission from the two remote exposure switches or hand-held timer.
- SW4 to ON and SW5 to ON to disable the exposure switch of the hand-held timer.



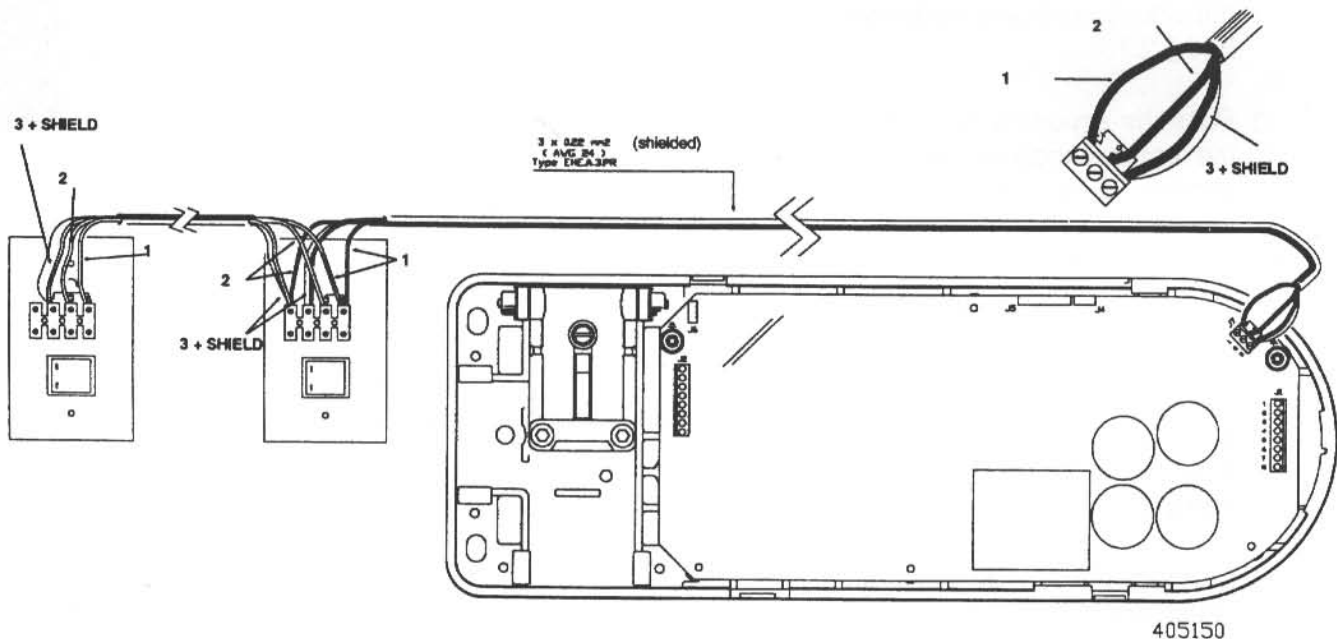
➤ Close the hand-held timer.

### ☐ Pass the exposure cable from the first switch to the wall frame.

- Use a shielded 3 x 0,22 mm<sup>2</sup> cable type EHEA.3PR or a 3 stranded cable 24AWG.

### ☐ Place and mount the remote exposure switches at locations desired as described in § 2.8.

### ☐ Connect the units as shown diagram below.



### ☐ Fix the front covers as described § 2.8.

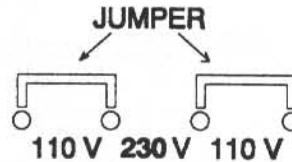
**NOTE :** If local codes require disabling of the exposure switch of hand-held timer, do not forget to set SW4 and SW5 to ON.

### 3. ELECTRICAL INSTALLATION

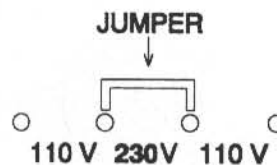
#### 3.1. ELECTRONICS BOARD CONFIGURATION

- ☐ Check the Mains voltage.
- ☐ Check the position of the jumpers on the electronics board
  - Check that the 3 sets of Mains jumpers on the board correspond to the measured Mains voltage.

- on 110 V: 3 times 2 jumpers



- on 230 V: 3 times 1 jumper



- **ELITYS®/ELITYS.E®** adaptation on bridges JP1 and JP2



- The physical positioning of the jumpers is indicated in the diagram on page 28, Chapter IV "Setting to work".

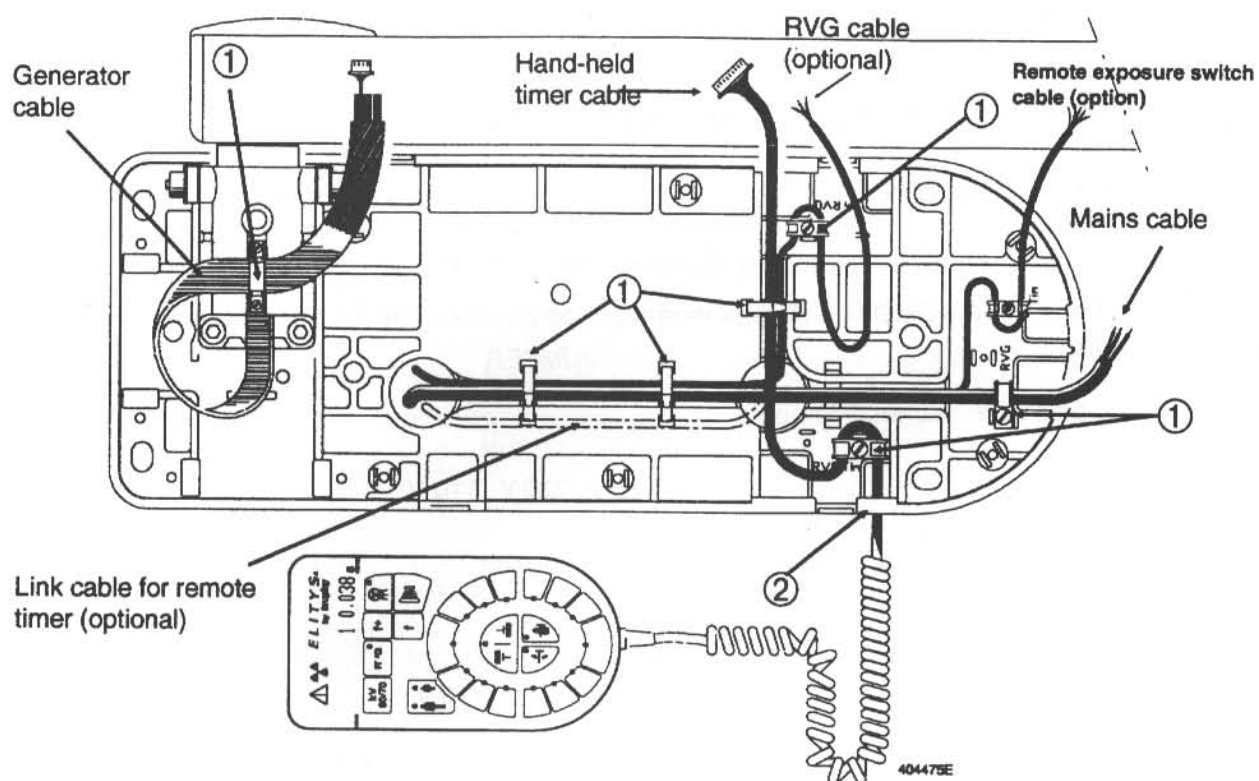
- ☐ Fuses F1 and F3 must be neutral links.

#### 3.2. ELECTRONICS BOARD INSTALLATION

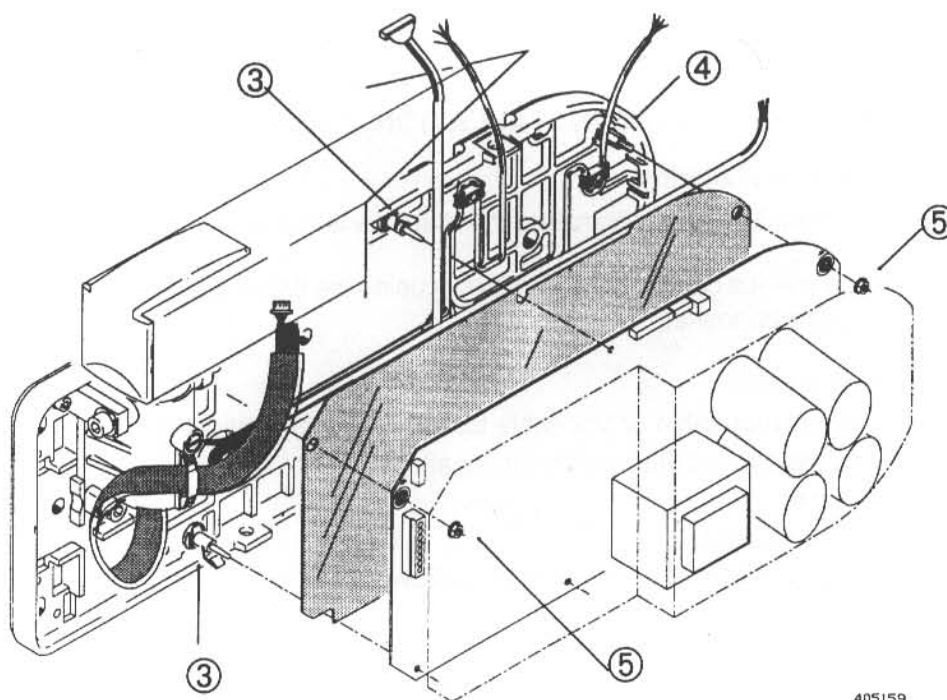
##### 3.2.1. Mechanical installation

- Check the circuit-breaker controlling the machine is not live.
- Position the various cables in the framework using the cable-clamps ① supplied, according to the diagram opposite.
  - Generator cable
  - Hand-held timer cable or link cable for remote timer (optional)
  - Remote exposure switch cable (optional)
  - Mains cable
  - RVG cable (optional)
    - Connect the 3 cable wires - white, yellow and blue - to the connecting block in the framework.

External cables must pass through the openings in the wall framework's metalwork, e.g. through ② for the hand-held timer cable.



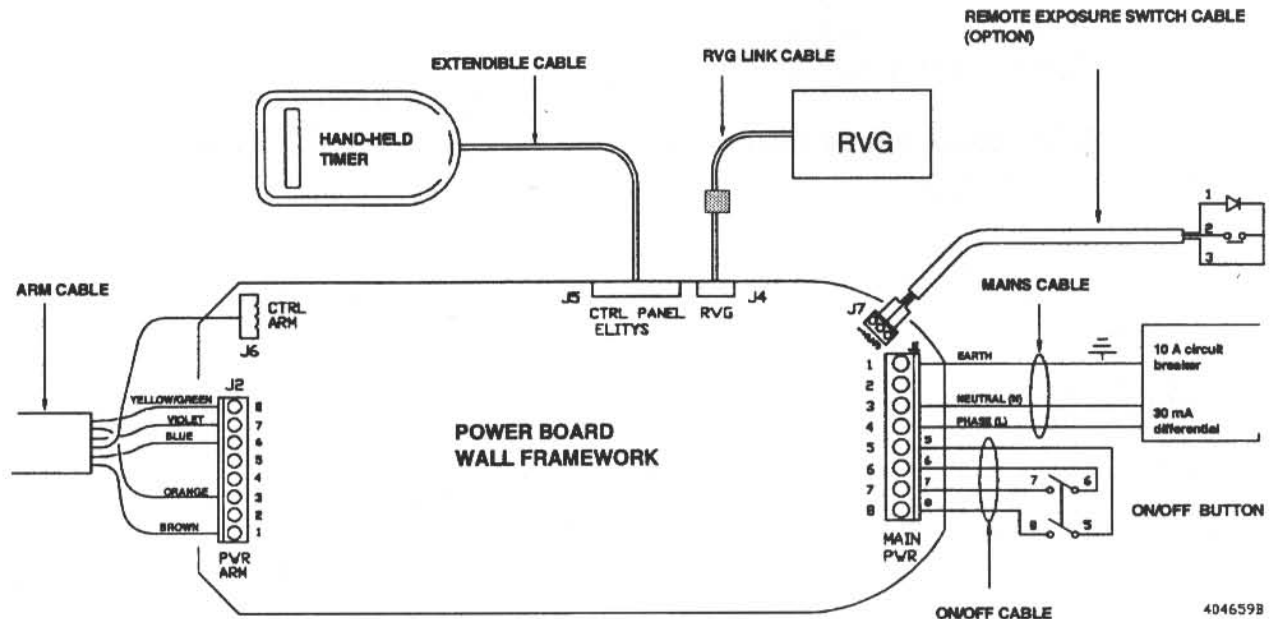
- > Position the insulating sheet on the plastic clips ③ and on the earth pins ④.



- > Install the board in the wall framework on the nylon clips ③ designed for this purpose and mount the nylon screws.
- > Put the two 7 nuts ⑤ for grounding in place on the ground pins ④.

### 3.2.2. Wiring

Connect all the wires in accordance with the wiring diagrams below and opposite.

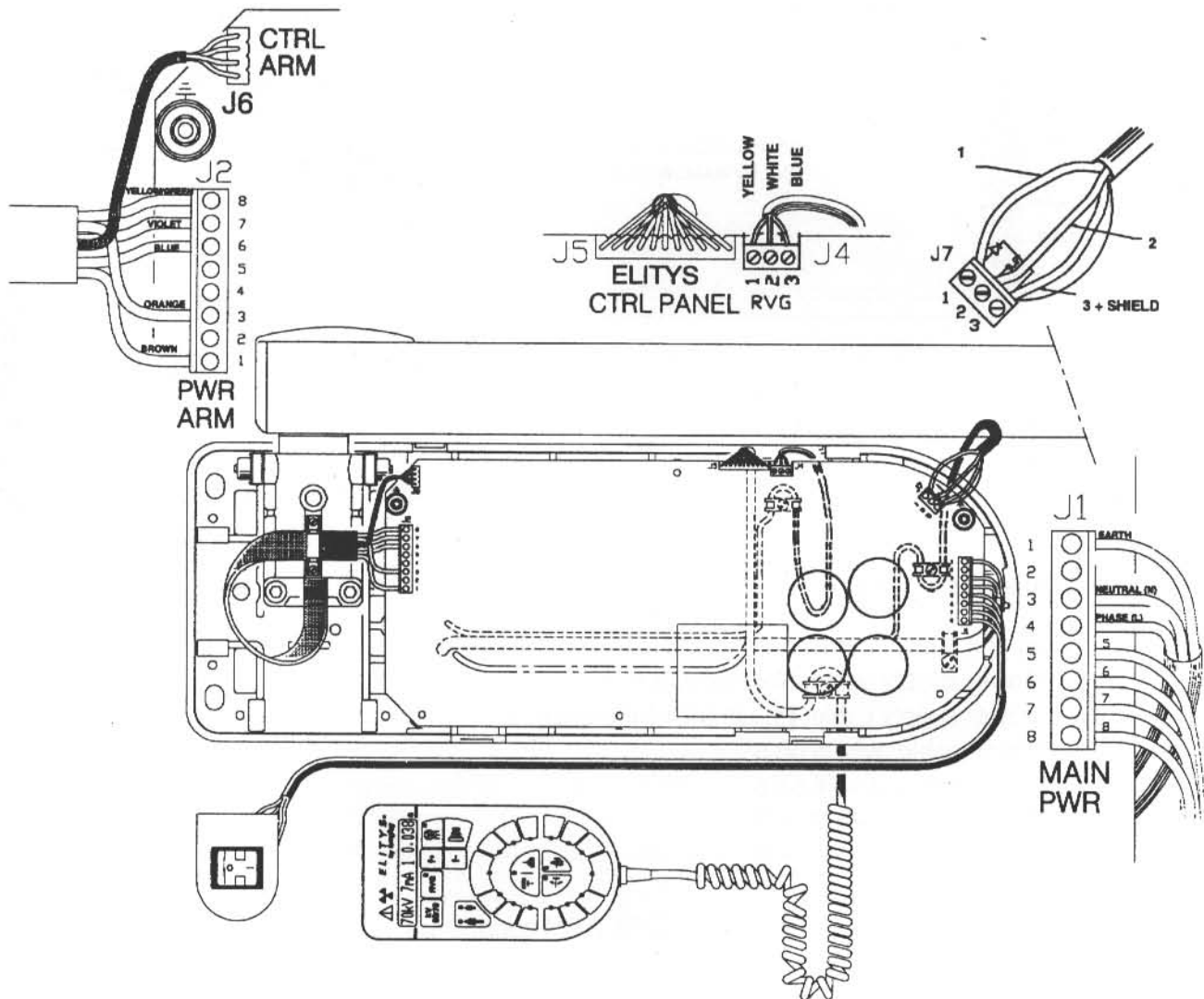


- > RVG link cable to the RVG connector
- > Hand-held timer cable or link cable for remote timer (optional) to the CTRL PANEL ELITYS connector
- > Mains wiring: MAIN PWR connector on the board
  - Power supply cable: Earth on 1 (reference ⊕ )
  - Power supply cable: Neutral on 3 (reference N)
  - Power supply cable: Phase on 4 (reference L)
  - On/off cable: wire 5 on 5
  - On/off cable: wire 6 on 6
  - On/off cable: wire 7 on 7
  - On/off cable: wire 8 on 8
- > Generator wiring: PWR ARM and CTRL ARM connectors on the board
  - Arm cable: brown wire on PWR ARM-1
  - Arm cable: orange wire on PWR ARM-3
  - Arm cable: blue wire on PWR ARM-6
  - Arm cable: violet wire on PWR ARM-7
  - Arm cable: green-yellow wire on PWR ARM-8
  - Arm cable: white 4-pin plug on CTRL ARM



- > Put the excess cable in the extension arm.
- > Remote exposure switch wiring
  - Blue wire on 1 (reference  $\overline{\text{—}}\triangle\text{—}$ )
  - Red wire on 2 (reference  $\text{—}\circ\text{—}$ )
  - Ground : crystal style and shield on 3 (reference  $\text{—}$ )

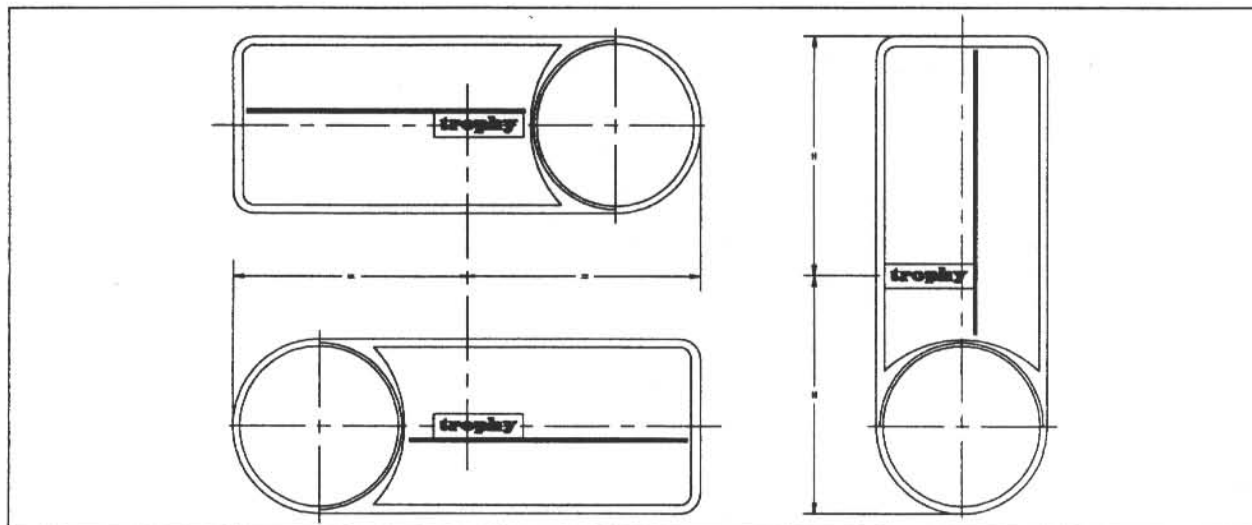
**NOTE: colors may be different.**



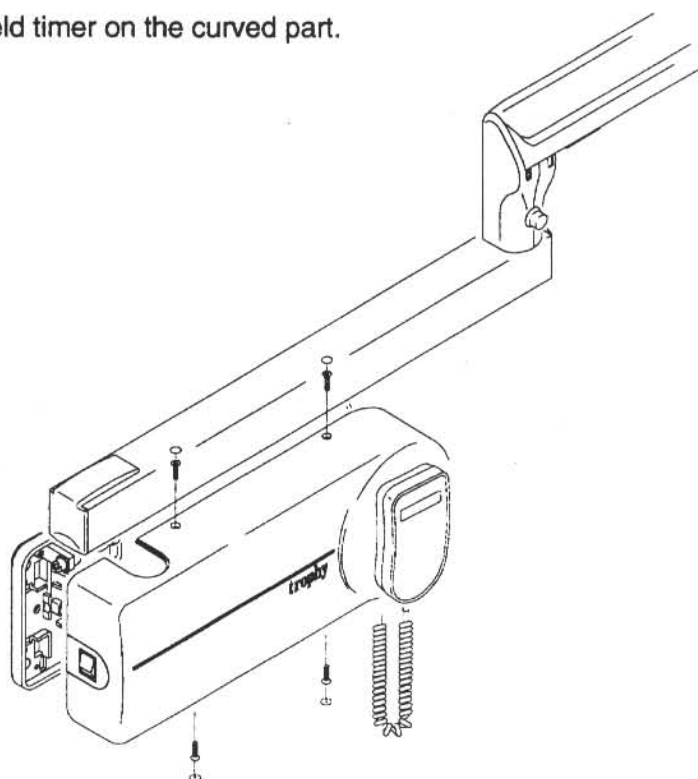
## 4. END OF INSTALLATION

**N.B.:** These operations should be carried out after the Setting to Work has been done.

- ☐ Place the TROPHY transfer label on the cover as shown below according to the orientation of the framework, having first cleaned the cover with an alcohol-based product.



- ☐ Place the On/Off switch in the cover recess corresponding to your orientation.
- ☐ Check all the plugs and cables are fixed securely.
- ☐ Install the framework cover as shown below with 4 screws and put the screw covers in place.
- ☐ Clean the whole machine, paying particular attention to the curved part of the wall framework cover to ensure the hand-held timer adheres properly.  
Use an alcohol-based product; solvent-based products must never be used.
- ☐ Place the hand-held timer on the curved part.









## **IV. SETTING TO WORK**



## 1. CHECKING THE MAINS VOLTAGE

- ☐ Use the voltmeter on the 300 V AC range.
- ☐ Switch the machine off.  
Connect the voltmeter to the **L** and **N** terminals of the MAIN PWR connector on the electronics board.
- ☐ Switch the machine on.  
Set the parameters: film type 9, 60 kV, 7 mA, Occlusal mode.  
Note the voltmeter value (no-load voltage).
- ☐ Stand well behind the generator.  
Make an exposure.  
Note the voltmeter value during the exposure (on-load voltage). 
- ☐ The result of the following formula :  $V_{\text{no-load}} - V_{\text{on-load}}$  must be less than 4.5 V in 100, 110 or 130 V, and less than 9 V in 230 or 240 V (corresponding to 3%).
- ☐ If problems arise, refer to "Required Electrical Specifications" paragraph 4 Chapter II.

## 2. CHECKING THE mA

- ☐ Connect a 30V= range voltmeter to the test points **0 mA** and **RTN mA** complying with the polarities, the plus on **0 mA**.  
The measurement is the result of the product of the current (mA) multiplied by a resistance of 1 k $\Omega$  implemented on the board.
- ☐ When you switch the machine on, the hand-held timer must display the exposure parameters.  
The green LEDs of the electronics board (corresponding to +15 V, +12 V and +5 V) must light up.
- ☐ Programme an exposure by pressing the Occlusal function key.
  - . Set the parameters: film type 9, 60 kV, 4 mA, Occlusal mode, using the keys to select film sensitivity, to select the kV values and for RVG.
  - . Stand well behind the generator and make an exposure.   
Note the voltmeter value.
    - This value must be between 3.4 V and 4.6 V; otherwise contact a TROPHY technician.

- ☐ Programme an exposure by pressing the Occlusal function key.
  - . Set the parameters: film type 9, 70 kV, 4 mA, Occlusal mode, using the keys to select film sensitivity, to select the kV values and for RVG.
  - . Stand well behind the generator and make an exposure.  
Note the voltmeter value.
    - This value must be between 3.4 V and 4.6 V; otherwise contact a technician approved by TROPHY.
- ☐ Programme an exposure by pressing the Occlusal function key.
  - . Set the parameters: film type 9, 70 kV, 7 mA, Occlusal mode, using the keys to select film sensitivity, to select the kV values and for RVG.
  - . Stand well behind the generator and make an exposure.  
Note the voltmeter value.
    - This value must be between 6.0 V and 8.0 V; otherwise contact a technician approved by TROPHY.



 **Switch off the machine and terminate installation - Chapter III, section 4 page 26.**

### 3. HAND-HELD TIMER INITIALIZATION

- ☐ Switch off the machine if necessary.
- ☐ Press the RVG key and at the same time switch the machine on.
- ☐ All the hand-held timer indicator lights will be tested one by one, except the X-Ray emission light.
- ☐ The audible signal and the display unit are also tested.
- ☐ At the end of the test, the machine is initialized and the exposure counter is reset.
- ☐ To finish preparing for operation carry out the checks described in the "Preventive Maintenance" chapter.

## **V. PREVENTIVE MAINTENANCE**

## 1. CLEANING

- ☐ You are advised to use a **non-corrosive** alcohol-based product, and to avoid introducing liquid inside the machine.

## 2. CHECKING

TROPHY recommends you carry out the periodic preventive maintenance operations described below. They should be performed when the machine is first installed and then annually.

---

### IMPORTANT

If your TROPHY X-Ray unit does not satisfy all these checks, refer to the "Corrective Maintenance" chapter in this manual, or contact your authorised TROPHY distributor. In the meantime you should not use the equipment.

---

#### 2.1. GENERATOR

- ☐ Check that the specifications label is legible and intact.
- ☐ Check there are no oil leaks.

#### 2.2. FIXING THE COMPLETE UNIT TO THE WALL

- ☐ Check that all the labels are clearly legible.
- ☐ Check that the wall framework is securely fixed. If it is not, check the installation exactly as stipulated in the procedure described in the "Installation" chapter.
- ☐ If the installation includes a 825 mm (32-1/2 in.) extension arm, check that 360° rotation of the scissor arm is restricted by the limitation system installed on the extension arm to prevent the power supply cable being ripped out.

#### 2.3. FLEXIBLE MOVEMENT

- ☐ Check that the arm is flexible in all positions, and that it remains immobile when no longer handled.

#### 2.4. HAND-HELD TIMER AND ELECTRICAL INSTALLATION

- ☐ Check that the symbols are always clearly legible.
- ☐ Check that the hand-held timer cable and the power supply cable are in good condition.
- ☐ Check that grounds are correctly installed.
- ☐ Check that the exposure switch returns to its initial position after use.

## 2.5. FUNCTIONING

- ☐ Switch the timer on.
- ☐ Check that the green "on" light is lit.
- ☐ Programme an exposure by pressing the Occlusal function key.
  - . Set the parameters: film type 9, 60 kV, 7 mA, Occlusal mode, using the keys to select film sensitivity, to select the kV values and for RVG.
  - . Stand well behind the generator and take an exposure.
- ☐ Check that the X-Ray emission light comes on during the exposure, that the counter counts down to zero and that the audible signal stops when X-Ray emission terminates.
- ☐ Make an exposure and check that when the exposure switch is released before the end of the exposure the display unit indicates "OP. ERROR" and an audible signal different from the previous one is emitted.



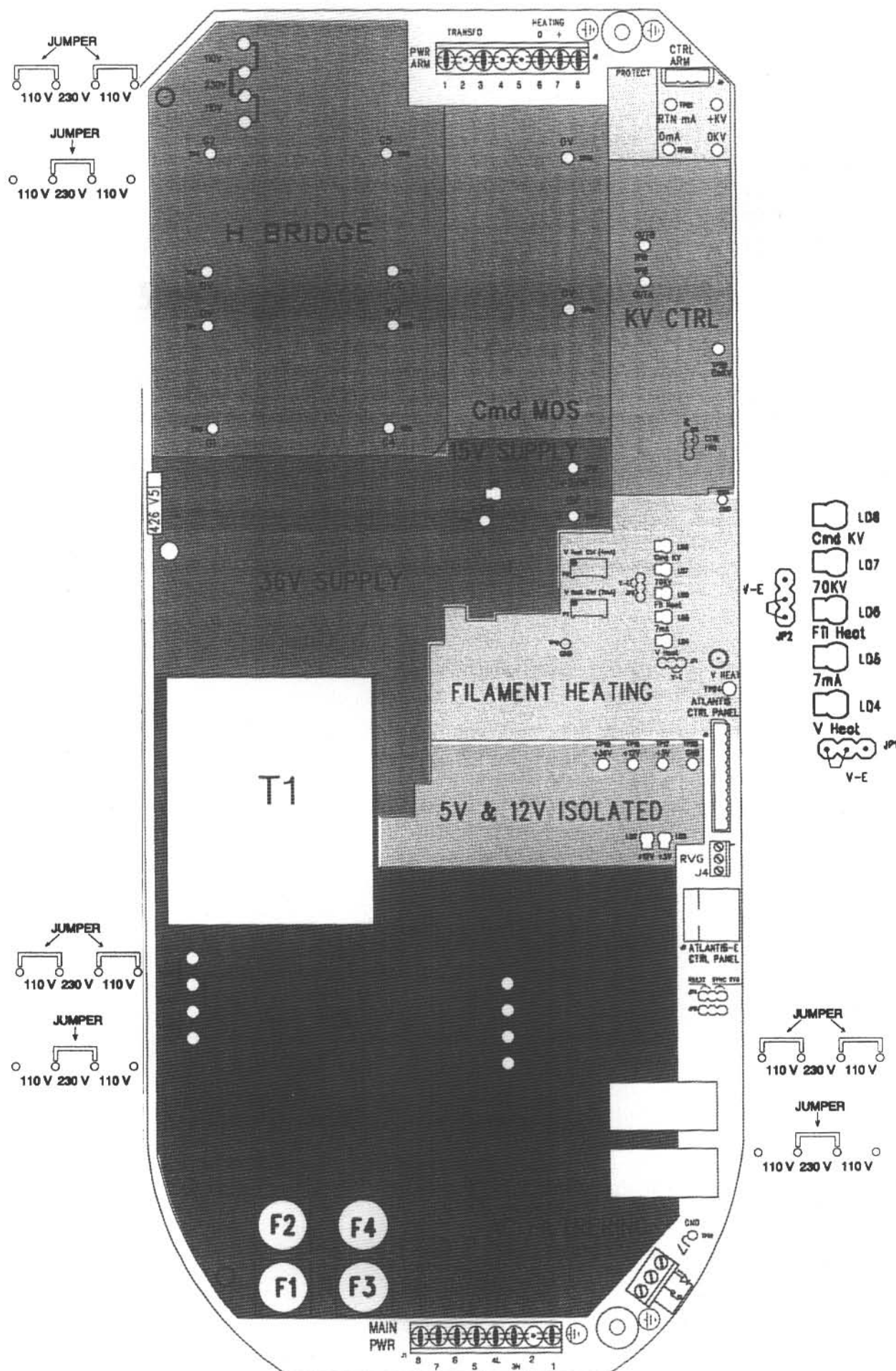
## 2.6. SELF-TEST

- ☐ Switch the machine off.
- ☐ Press the RVG key while simultaneously switching the machine on.
- ☐ As soon as the first light comes on, release the RVG key.
  - . All the functions and indicator lights of the hand-held timer will be tested one by one, except the X-Ray emission light. The audible alarm and display unit are also tested.
  - . At the end of this test, the number of exposures carried out since the machine was put into operation is displayed. A short beep indicates the test has ended.
- ☐ If one of the lights or the sound signal does not work, contact your authorised TROPHY distributor.
- ☐ At the end of this verification, check that the User's Manual is available with the machine.



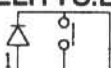


## **VI. CORRECTIVE MAINTENANCE**



## 1. MAIN COMPONENTS

### 1.1. CONNECTORS

MAIN PWR	Mains power supply and On/Off button
PWR ARM	Generator cable
RVG	Cable for RVG (RS232 link)
ELITYS CTRL PANEL	Hand-held timer cable
CTRL ARM	Generator cable (safety devices)
ELITYS.E CTRL PANEL	For the <b>ELITYS.E®</b> model only.
	Remote exposure switch cable

### 1.2. JUMPERS

JP1 - JP2	Adaptation to 110 V - 230 V Mains voltage
JP3 - JP4	Adaptation to <b>ELITYS®</b> or <b>ELITYS.E®</b>
	Adaptation to RVG or RS 232

### 1.3. LEDS

+15 V	+15 V
+12 V	+12 V
CMD KV	kV control
7 mA	7 mA
FIL HEAT	Filament heating
70 kV	70 kV
V HEAT	Heating voltage
+5 V	+5 V

### 1.4. FUSES

#### . Protection of control components

F2	in 230 V/250 V : 300 mA 5 x 20
	in 100 V/110 V/ 130 V : 800 mA 5 x 20

#### . Protection of power components

F4	in 230 V/250 V : 5 A 5 x 20
	in 100 V/110 V/ 130 V : 10 A 6,33 x 32

#### . Neutral line

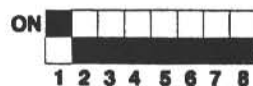
F1 - F3	neutral links
---------	---------------

## 1.5. HAND-HELD TIMER DIPSWITCHES

This bank of dipswitches are located in middle right hand side of the PCB of the timer.



Factory setting. Enabling only exposure switch from hand-held timer



Disabling of RVG mode



For Australia: film type (1 to 6) selection by two extra keys



For Australia: film type (1 to 5) selection by two extra keys



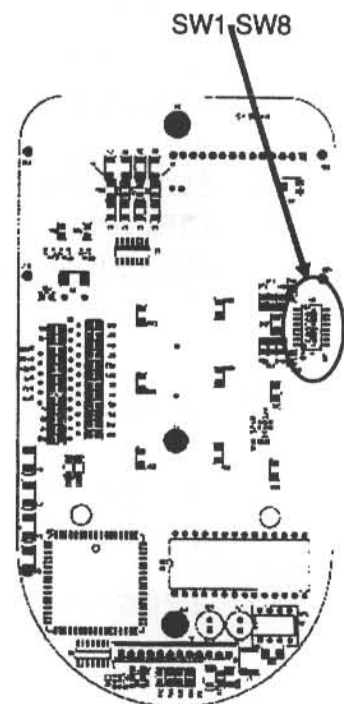
Enabling remote exposure switch



Enabling remote exposure switch **AND** exposure switch from hand-held timer. X-Ray emission only when both activated.



Enabling remote exposure switch and disabling exposure switch from hand-held timer



## 2. DIAGNOSIS

### 2.1. TIMER SELF-TEST

- ☐ Switch the machine off.
- ☐ Press the RVG key while simultaneously switching the machine on.
- ☐ As soon as the first light comes on, release the RVG key.
  - . All the functions and indicator lights of the hand-held timer will be tested one by one, except the X-Ray emission light. The audible alarm and display unit are also tested.
  - . At the end of this test, the number of exposures carried out since the machine was put into operation is displayed.
- ☐ A short beep indicates the test has ended.

If one of the lights or the sound signal does not work, contact your authorised TROPHY distributor.

## 2.2. ERROR MESSAGES

<b>COOLING</b>	Cooling cycle
<b>OP. ERROR</b>	Premature release of the exposure switch. The display indicates the remaining exposure time.
<b>kV ERROR</b>	The generator's high voltage value is more than 10% below the required value.
<b>POWER ERROR</b>	No Mains voltage or filament voltage.

## 2.3. CANCELLING THE DIFFERENT ERROR MESSAGES

- ☐ To cancel the message "**OP. ERROR**" (manipulation alarm) and the corresponding audible signal, press any key on the arch.  
Manipulation alarm: premature release of the exposure switch.
- ☐ To cancel the messages "**kV ERROR**" and "**POWER ERROR**" you must switch off the machine. See page 44.
- ☐ The message "**COOLING**" will stop when the generator has returned to a satisfactory temperature.

## 3. TROUBLE-SHOOTING HINTS

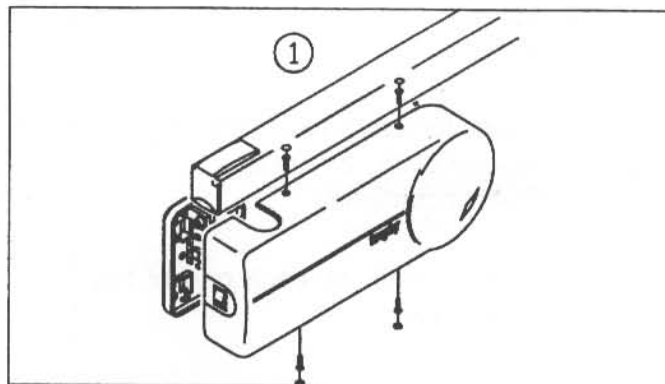
PROBLEM	CAUSE	SOLUTION
Nothing lights up	Machine disconnected	Connect the machine
	Fuse F4 defective	Change the fuse
	Main circuit-breaker OFF	Put it ON
Nothing lights up on the hand-held timer	Hand-held timer disconnected	Connect the hand-held timer
	Fuse F2 defective	Change the fuse
	Defective hand-held timer	Replace the hand-held timer
No X-Ray emission	The generator is cooling	Wait for the " <b>COOLING</b> " message to disappear
	Exposure switch key defective	Replace the hand-held timer
	Improper dipswitch selection	Set correctly the dipswitch, see page 42

PROBLEM	CAUSE	SOLUTION
Emission OK but exposure is too light, or even white	Wrong film type	See film type table on page 18 of the User's Manual
	Generator wrongly positioned	Adjust position
	Exposure time too short	Modify the time selection
	Development time too short	Refer to development instructions
	Developer too cold	Heat it
	Developer too old	Change it
	RVG key incorrectly selected	Adjust according to equipment used
	Film wrong way round	Refer to the film positioning section
	Incorrect installation	Call a qualified technician
Emission OK, but exposure is too dark	Wrong film type	See film type table on page 18 of the User's Manual
	RVG key incorrectly selected	Adjust according to equipment used
	Development time too long	
OP. ERROR	The exposure switch was released before the end of exposure	Select a tooth to stop the alarm. The display shows the remaining exposure time. Decide whether to develop or to make another exposure.
KV ERROR POWER ERROR	The microprocessor has detected a problem	Stop the machine and then restart it. If the problem continues, call a qualified technician.
	Fuse F2 or F4 blown out	Stop the machine, change the defective fuse(s), and restart. If the problem continues, call a qualified technician.

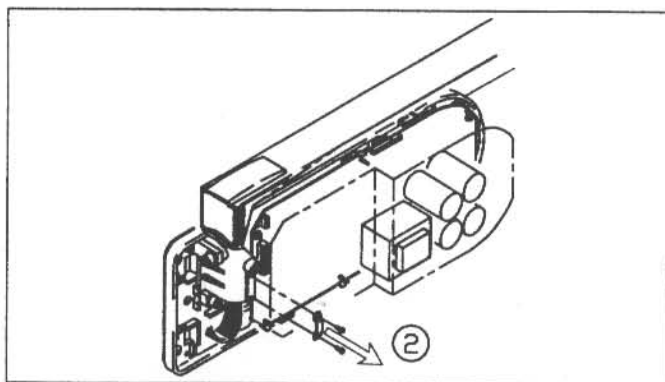
#### 4. PROCEDURE FOR CHANGING THE GENERATOR'S POWER SUPPLY CABLE

0 Switch the machine off.

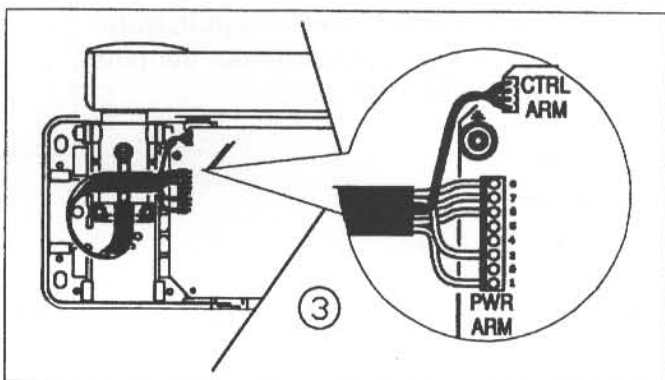
1 Remove the wall framework's cover by removing the screw covers and the 4 fixing screws. Take the On/Off switch out of its recess.



2 Remove the cable-clamp from the arm's cable.

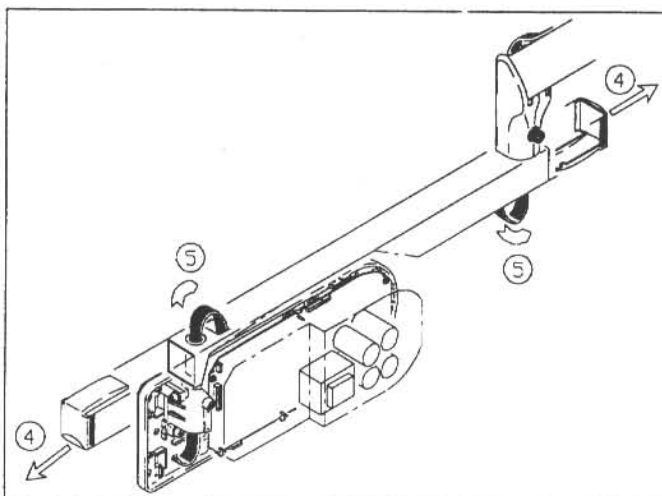


3 Disconnect the 2 plugs on the arm's cable from the PWR ARM and CTRL ARM connectors.



4 Remove the two plastic cable covers on the extension arm, revealing the arm cable.

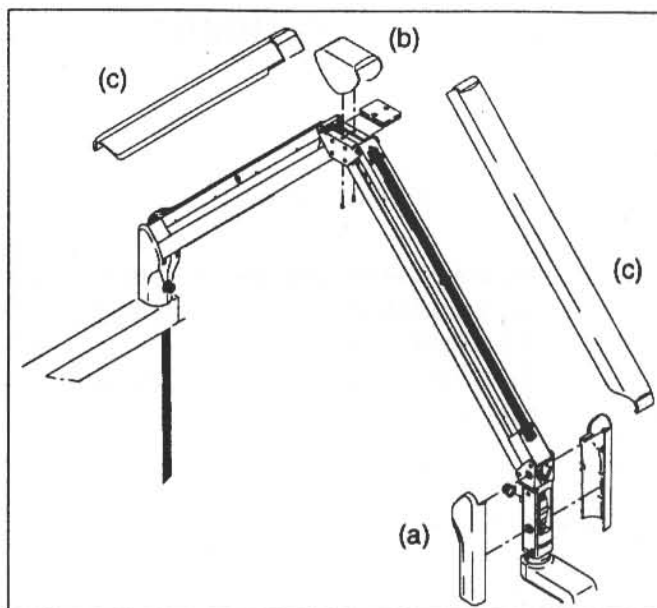
5 Take the cable out of the extension arm and let it hang from the end of the scissor arm.



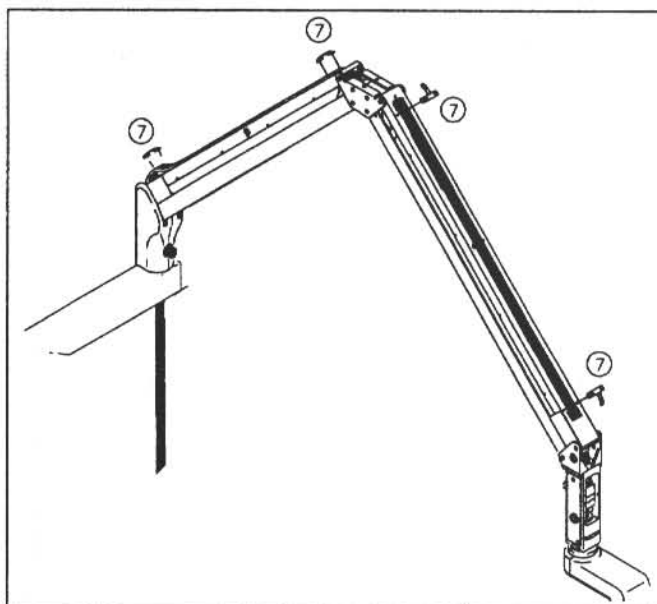


**6** Remove the scissor arm covers in the following order:

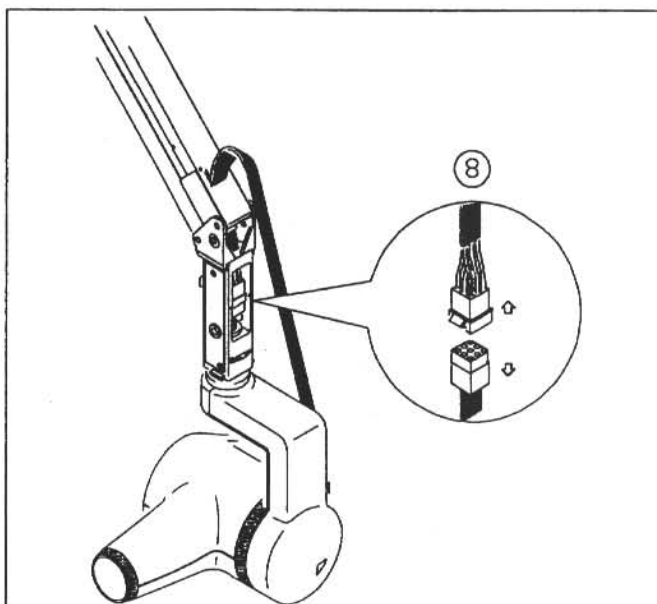
- (a) Covers for the generator support and ball stop
- (b) Cover for the central hinge, and the leaded plate, 2 screws accessible from underneath.
- (c) The 2 covers on each part of the scissor arm.



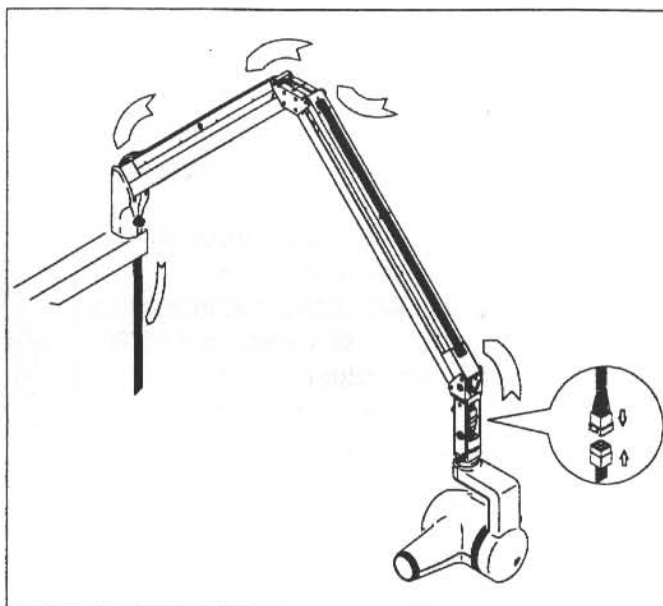
**7** Remove the 4 cable-clamps from the scissor arm, punching out the pins with a 2 mm pin punch.



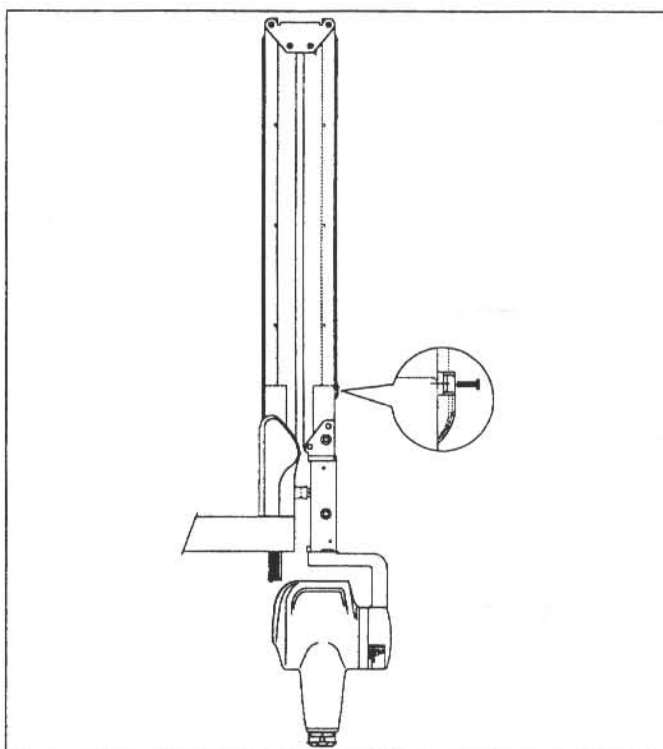
**8** Take out the cable, working towards the generator. Disconnect the generator plug and remove the cable from the bottom. Recover the cable-clamp pins.



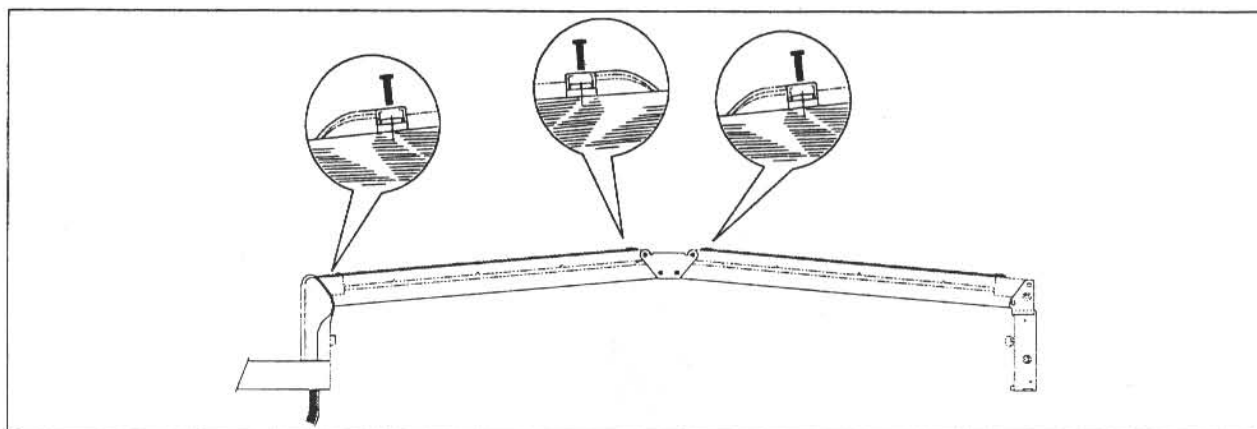
- 9** Take the new cable.  
Thread it into the top passage of the generator support.  
Be careful which way round the connectors are. The cable must not be twisted during installation. You must therefore check the position of connectors into the board and on generator connector.  
It is possible to place the scissor arm horizontally to facilitate the passage of the cable.  
Connect the cable to the generator connector.



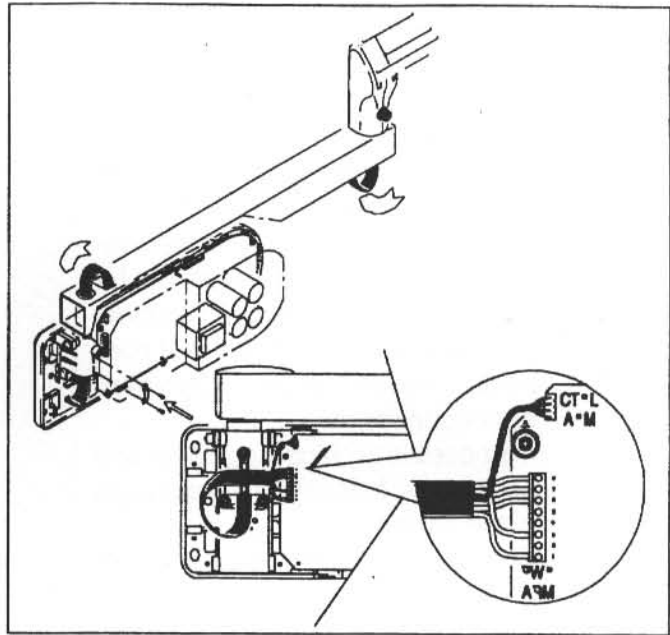
- 10** Put the scissor arm in a vertical position.  
Fix the bottom cable-clamp, on the generator level, using 2 pins.



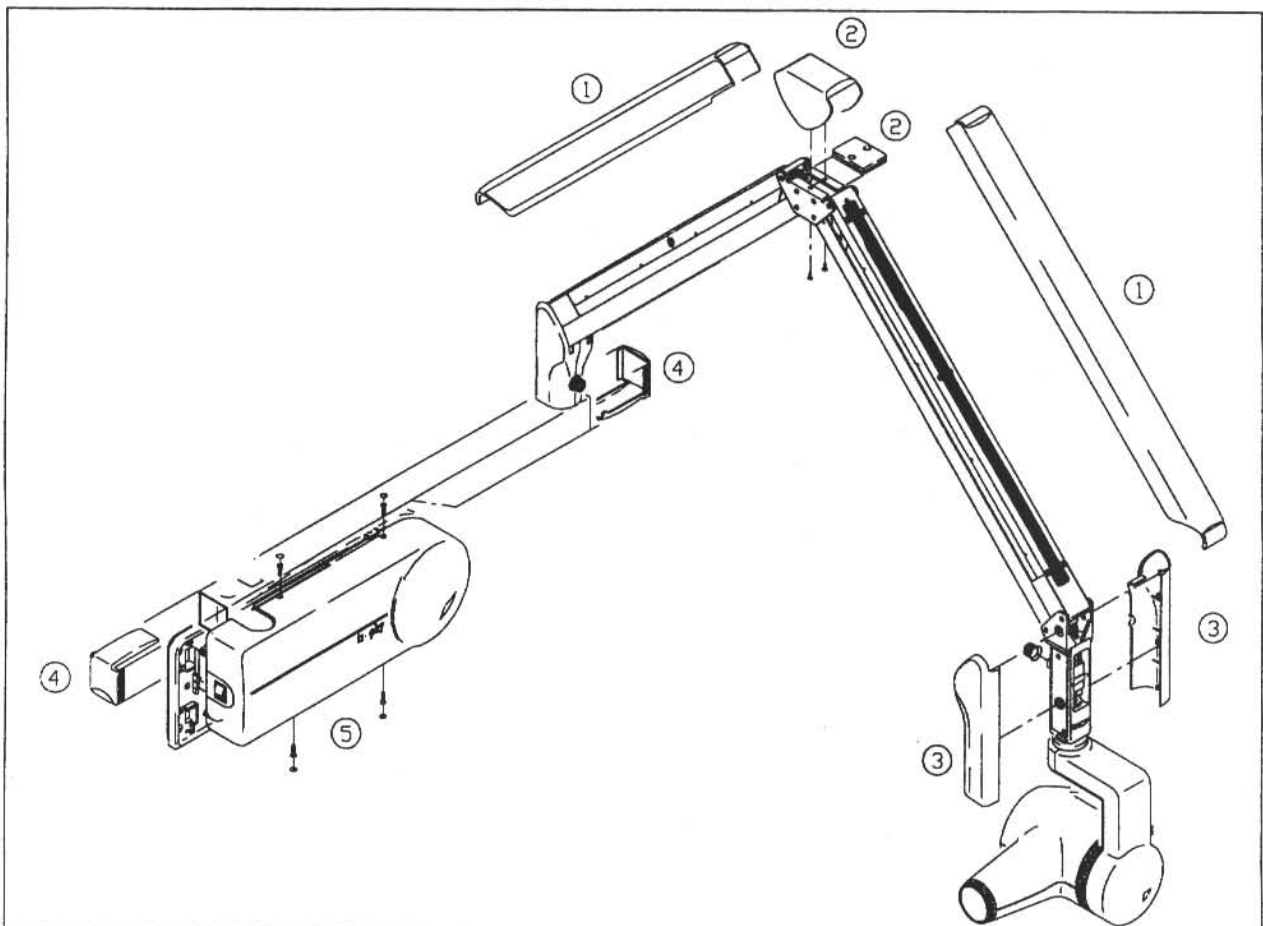
- 11** Extend the arm horizontally.  
Fix the other 3 cable-clamps with 2 pins each.  
The cable must not be slack, but it must not be taut either.



- 12** Pass the cables into the extension arm using the corresponding openings.  
 Remove the cable through the arm's support axis.  
 Connect the cable connectors to the board's PWR ARM and CTRL ARM connectors.  
 Fix the cable to the arm support using the cable-clamp.  
 Put the cable in excess in the extension arm.  
 Test the connection.

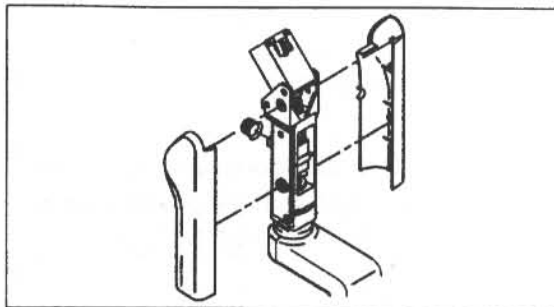


- 13** Reassemble the various covers in the order shown in the figure below.

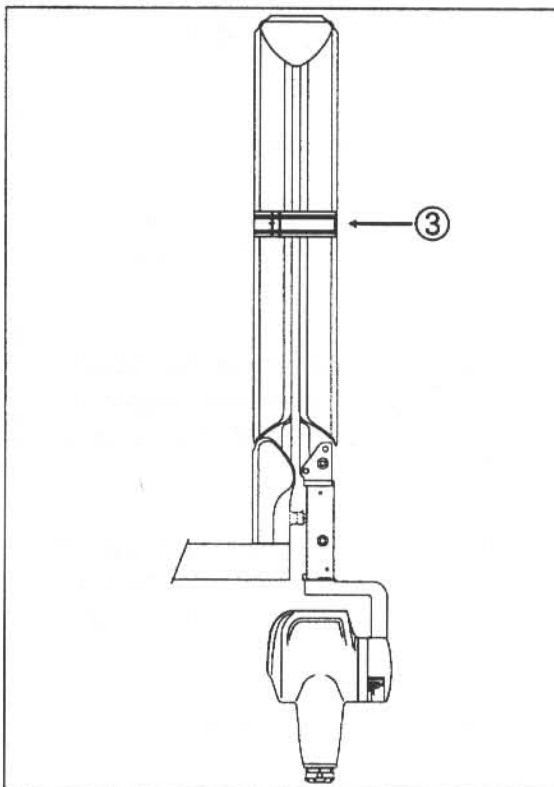


## 5. GENERATOR REPLACEMENT

- 1 Remove the 2 plastic covers on each side of the arm, as well as the stop device.



- 2 Put the scissor arm in the vertical position.



- 3 Strap the scissor arm so that it does not suddenly spring back when the generator is removed.

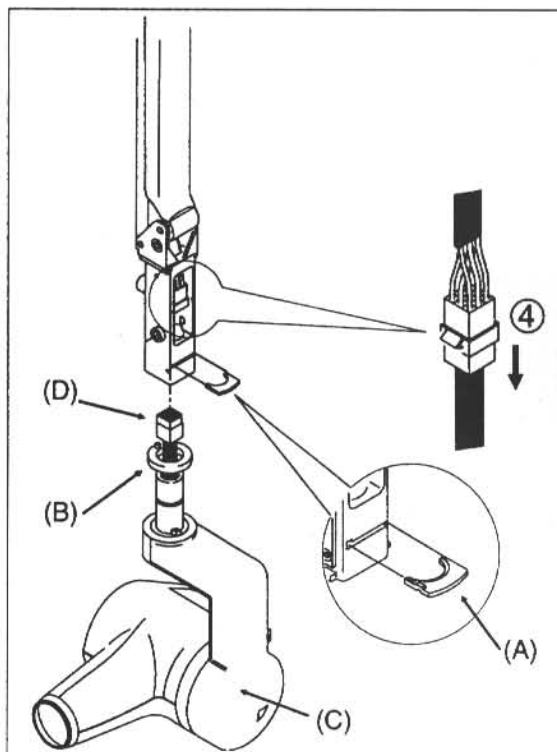
- 4 Remove the generator's connector (D) inside the scissor arm.

- 5 Hold the generator (C) firmly from underneath.

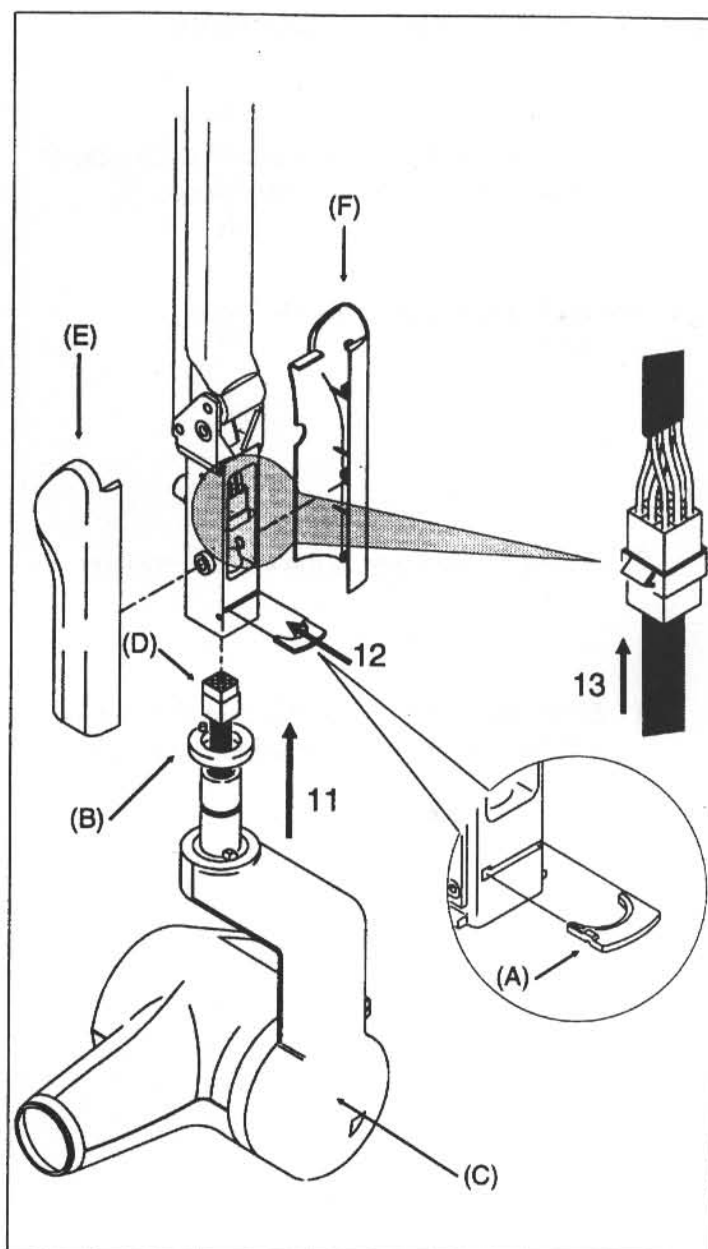
- 6 Remove the key (A) from its slot.

- 7 Let the generator down, holding it firmly.

- 8 Recover the ring preventing rotation (B).



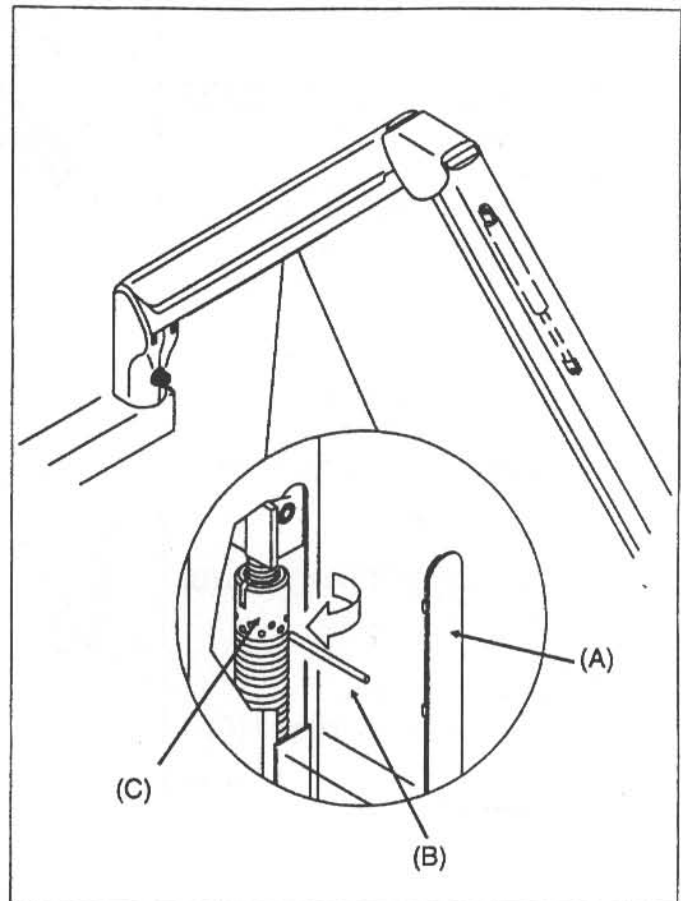
- 9 Take the new generator (C) and install the ring preventing rotation (B).
- 10 Carry the generator from underneath with the power supply socket towards the top (D).
- 11 Push upwards until the scissor arm and the generator are in contact.
- 12 Keep the generator in this position. Put the key (A) in its slot. You can now let go of the generator.
- 13 Insert the plug in the socket located inside the scissor arm and push until they lock together.
- 14 Install the two plastic covers (E) and (F) on each side of the arm. Make sure they are securely in place.
- 15 Remove the strap supporting the arm.



## 6. ARM STABILITY

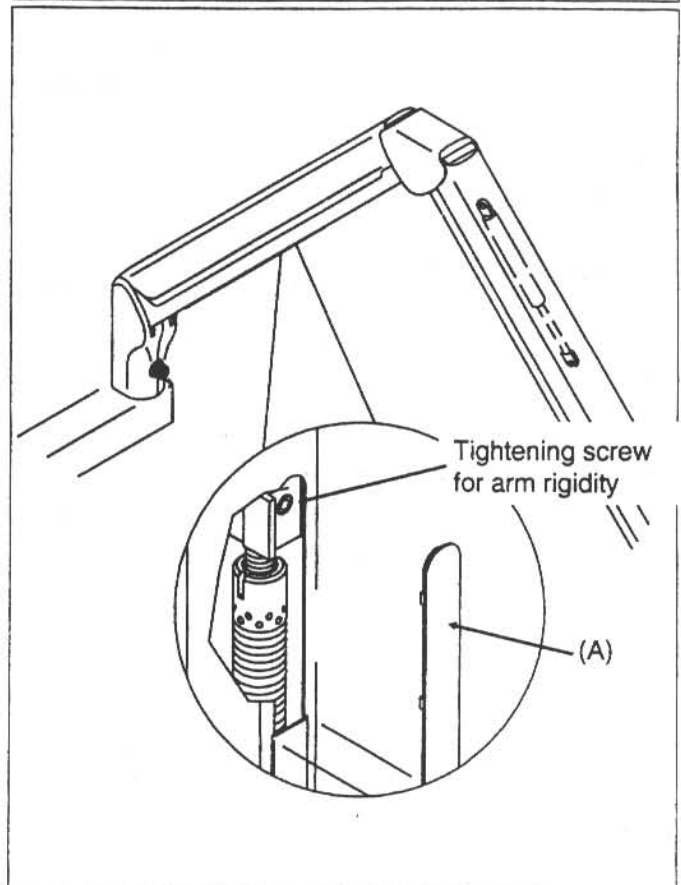
With prolonged use the arm may work loose, in this case tighten the spring on the lower arm.

- 1 Remove the access plate (A) with a screwdriver.
- 2 Use the 4 mm (.16 in.) diameter metal strip (B) supplied with the machine to tighten the spring (C) by turning the nut
  - in the direction shown on the drawing if the arm goes down.
  - In the other direction if the arm goes up.
- 3 Remove and put back in its place the metal strip.
- 4 Replace the access plate (A).



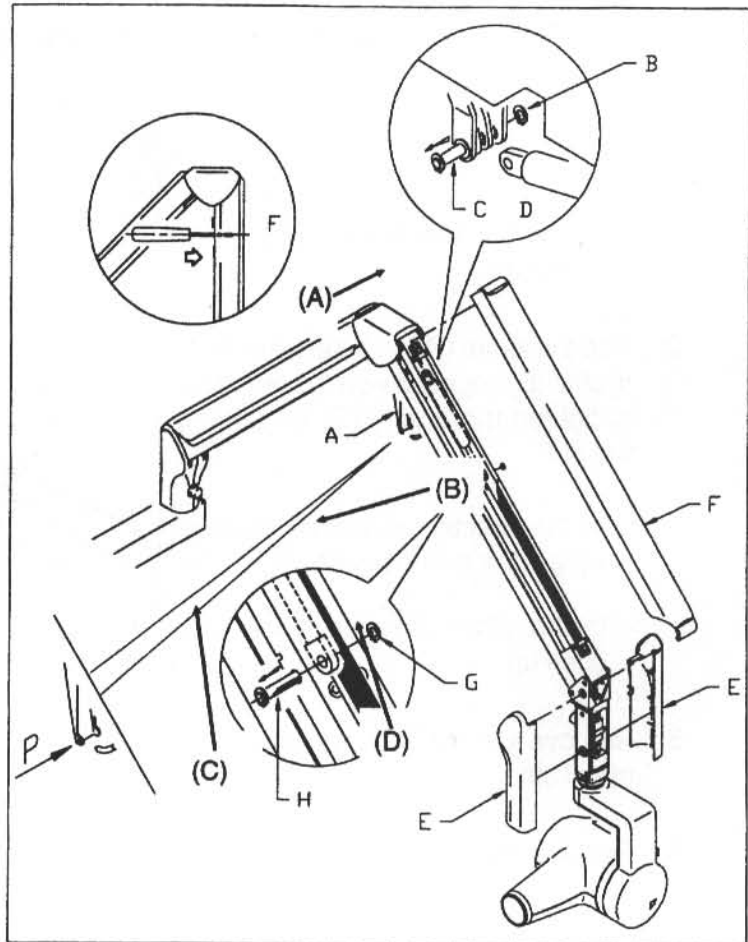
## 7. FLEXIBILITY ADJUSTMENT OF THE ARM MOVEMENT

- 1 Remove the access plate (A) with a screwdriver.
- 2 Tighten the tightening screw to harden the movement. Untighten the screw to smoothen the movement.
- 3 Replace the access plate (A).



## 8. FRONT JACK REPLACEMENT

- 1 Remove the two plastic covers (E) on the tank holder.
- 2 Put the front arm in a vertical position.
- 3 Remove the plastic cover (F) on the front arm using a 4 x 150 (.16 x 5.9 in.) screwdriver.
- 4 Remove the access plate (A) using the screwdriver, by pressing on its base, reference P.
- 5 Remove the "Truarc" rings (B) and (G).
- 6 Support the arm. Withdraw axles (H) and (C).
- 7 Extract the jack (D).

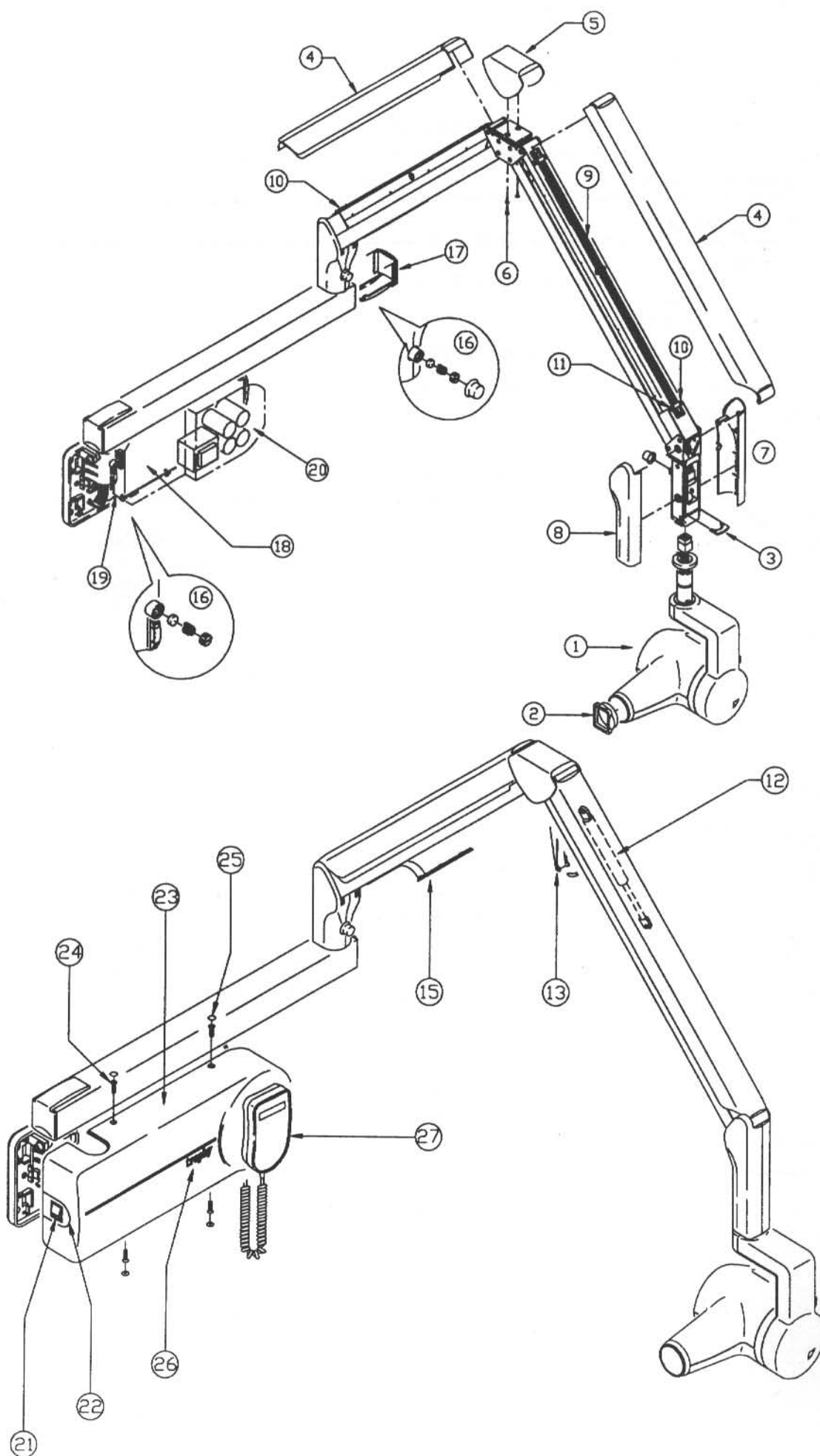


- 8 Take the new jack and insert it rod-end first in the arm opening. Put it in position and push back axle (H).
- 9 Take the axle (C). Place the jack end between the rods. Install the axle on this assembly.
- 10 Put the "Truarc" rings (B) and (G) back in place.
- 11 Replace the access plate (A).
- 12 Put the front arm in a vertical position again. Put the cover (F) back in position.
- 13 Put the two covers (E) back on the tank holder.

## **VII. SPARE PARTS LIST**

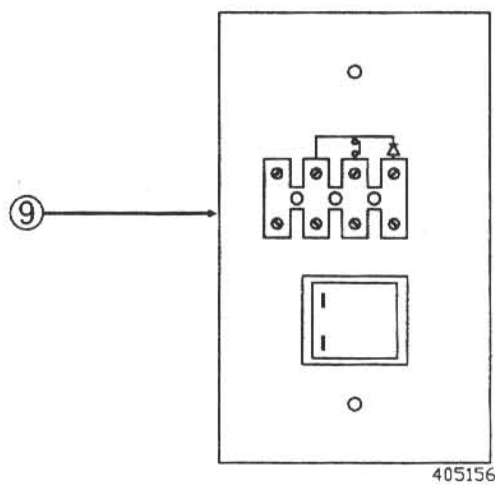
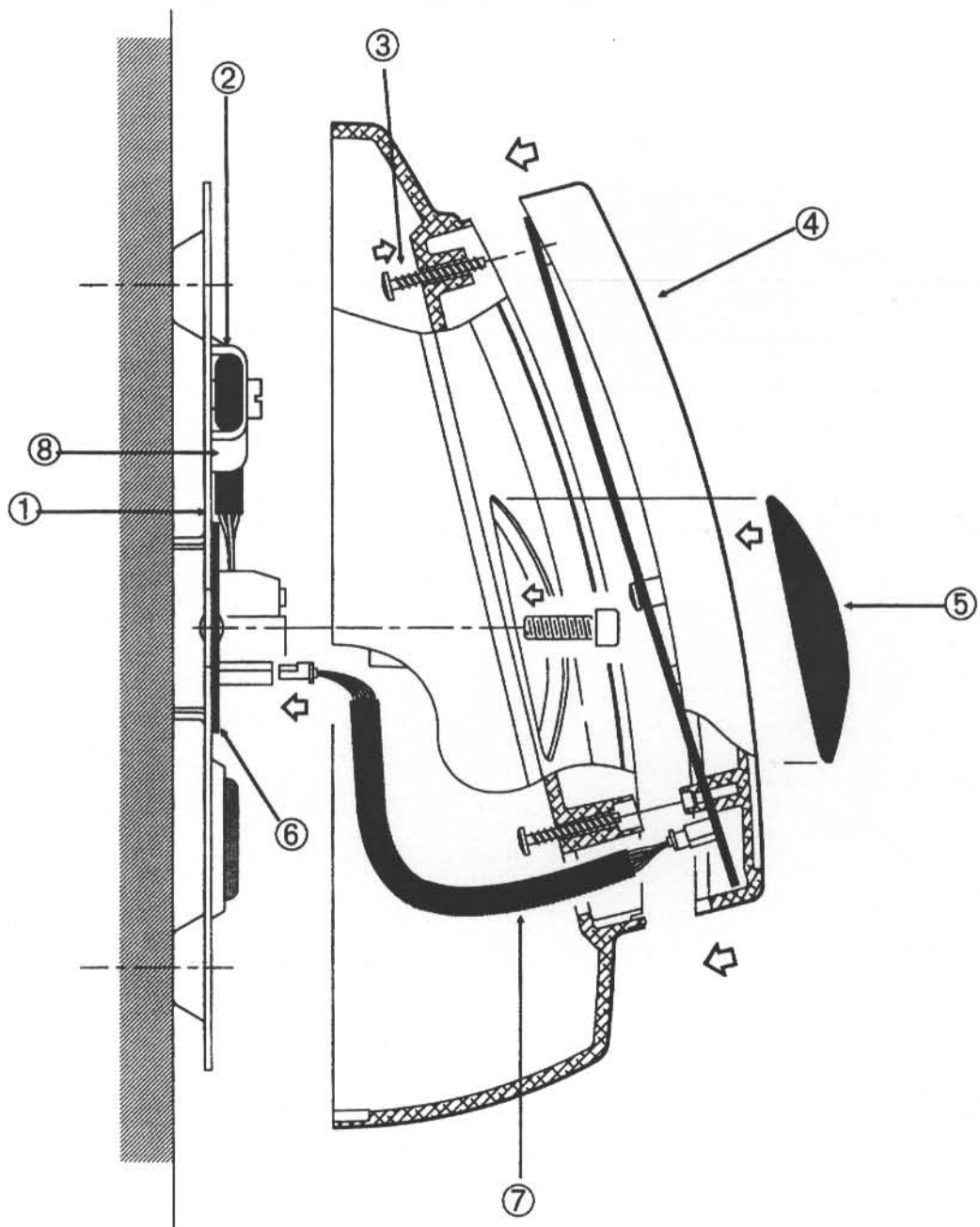


DESCRIPTION	REFERENCE	CODE
<b>GENERATOR</b>		
Complete 110 V generator	1	AT110
Complete 230 V generator	1	AT220
Rectangular collimator	2	CG653
Fixing key	3	HP210
<b>SCISSOR ARM</b>		
Plastic cover for scissor arm	4	HY202
Cover for arm's central hinge	5	HY203
2 Plasgob ST45 screws	6	NP048
Convex generator support cover	7	HY200
Concave generator support cover	8	HY201
Generator power supply cable	9	CP490
Cable-clamp for scissor arm	10	HY205
Nylon rivets for cable-clamp	11	PB078
Front jack	12	JW132
Front jack cover	13	HY208
Spring access plate	15	HY218
Brake kit	16	CL036
<b>EXTENSION ARM</b>		
Plastic covers	17	HY206
<b>WALL FRAMEWORK</b>		
Power board	18	CJ426
Board protection	19	DE164
110 V fuse	20	CO028
230 V fuse	20	CO029
On/Off switch bundle	21	CP489
On/Off switch opening cover	22	HY194



SPARE PARTS LIST

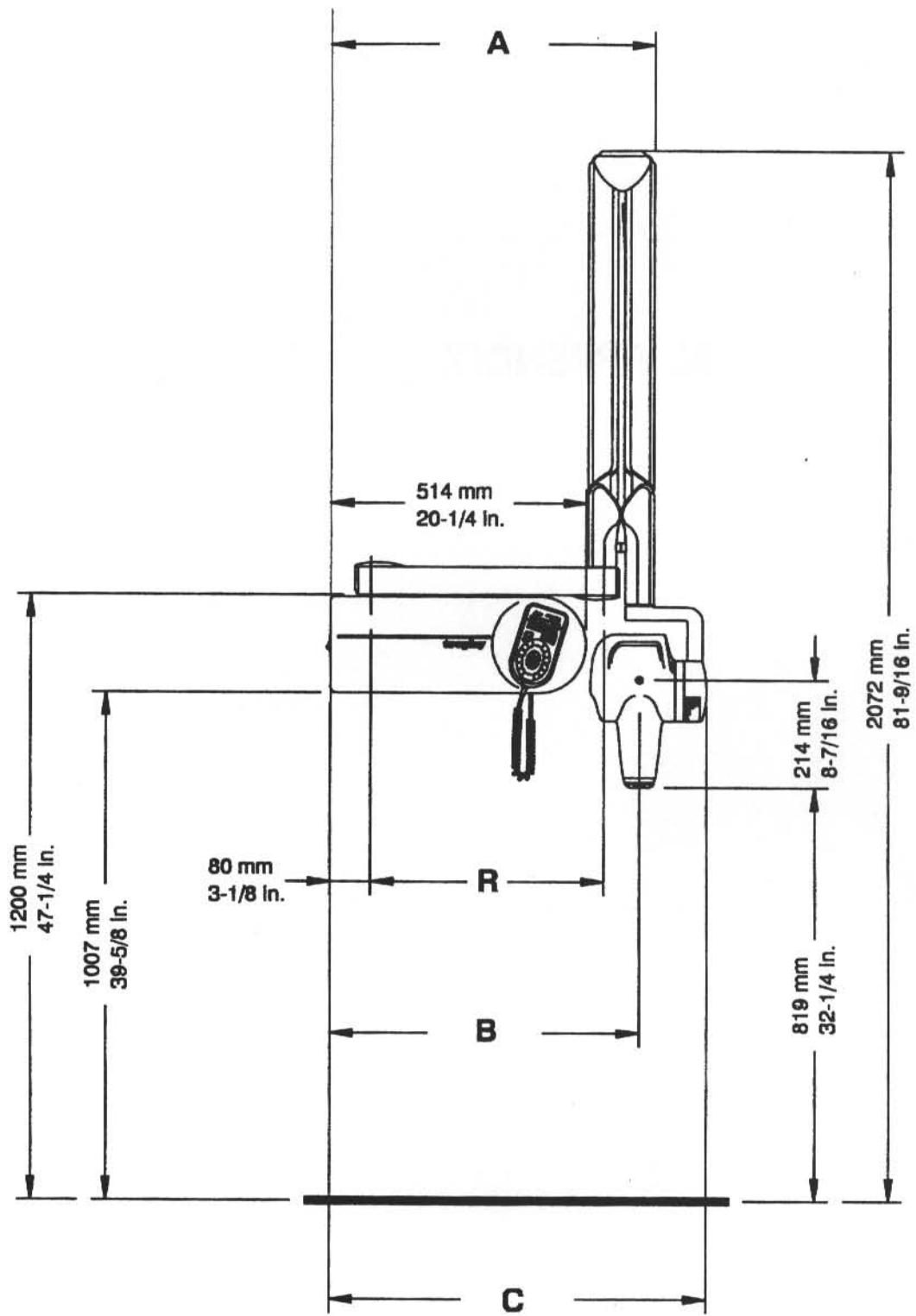
DESCRIPTION		REFERENCE	CODE		
WALL FRAMEWORK (continued)					
Cover for wall framework		23	HY195		
4 FHC M5 screws		24	NG091		
4 Screw covers		25	HY221		
TROPHY transfer label		26	JP587		
COMPLETE HAND-HELD TIMER					
Complete hand-held timer		27	CG617		
REMOTE TIMER					
Remote timer complete set		1	CG659		
Link cable: remote timer - wall framework		2	CP514		
Plasgob T45CBL screw		3	ND084		
Timer		4	CG617		
Screw cover		5	HY219		
Link board		6	CJ528		
Nylon rivet			PB078		
Cable-clamp		8	JC153		
Internal link cable		7	See table below		
		Standard version Power board		Version with remote timer interface board	
		CJ426V6	CJ426V7	CJ528V2	CJ428V3
Remote control board	CJ428V4	CP446	CP446	CP513	CP513
	CJ428V5	CP446	CP735	CP513	CP733
REMOTE EXPOSURE SWITCH BUTTON					
Button		9	AD142		



405156

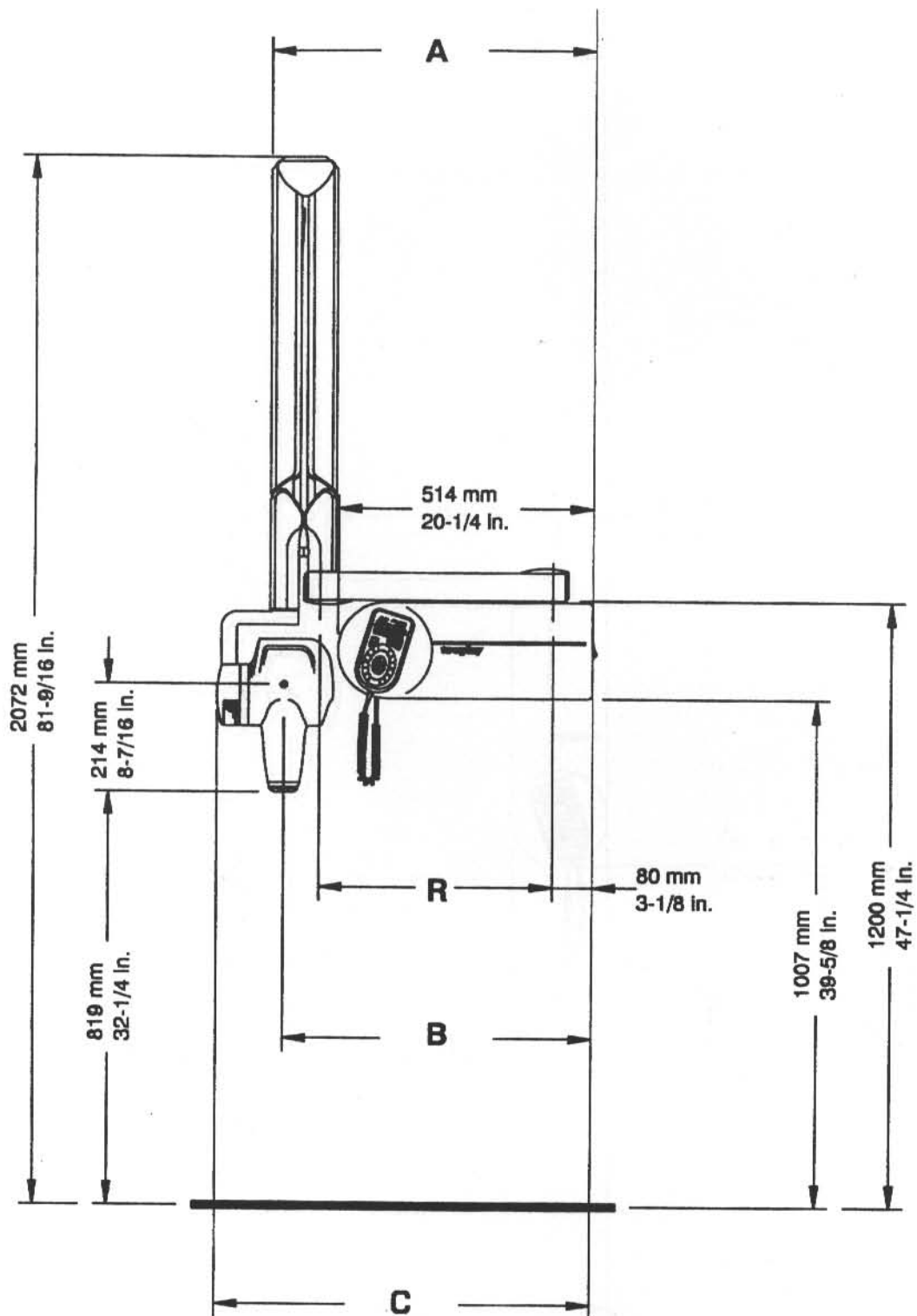


## **VIII. APPENDIX**



Space requirements - right installation

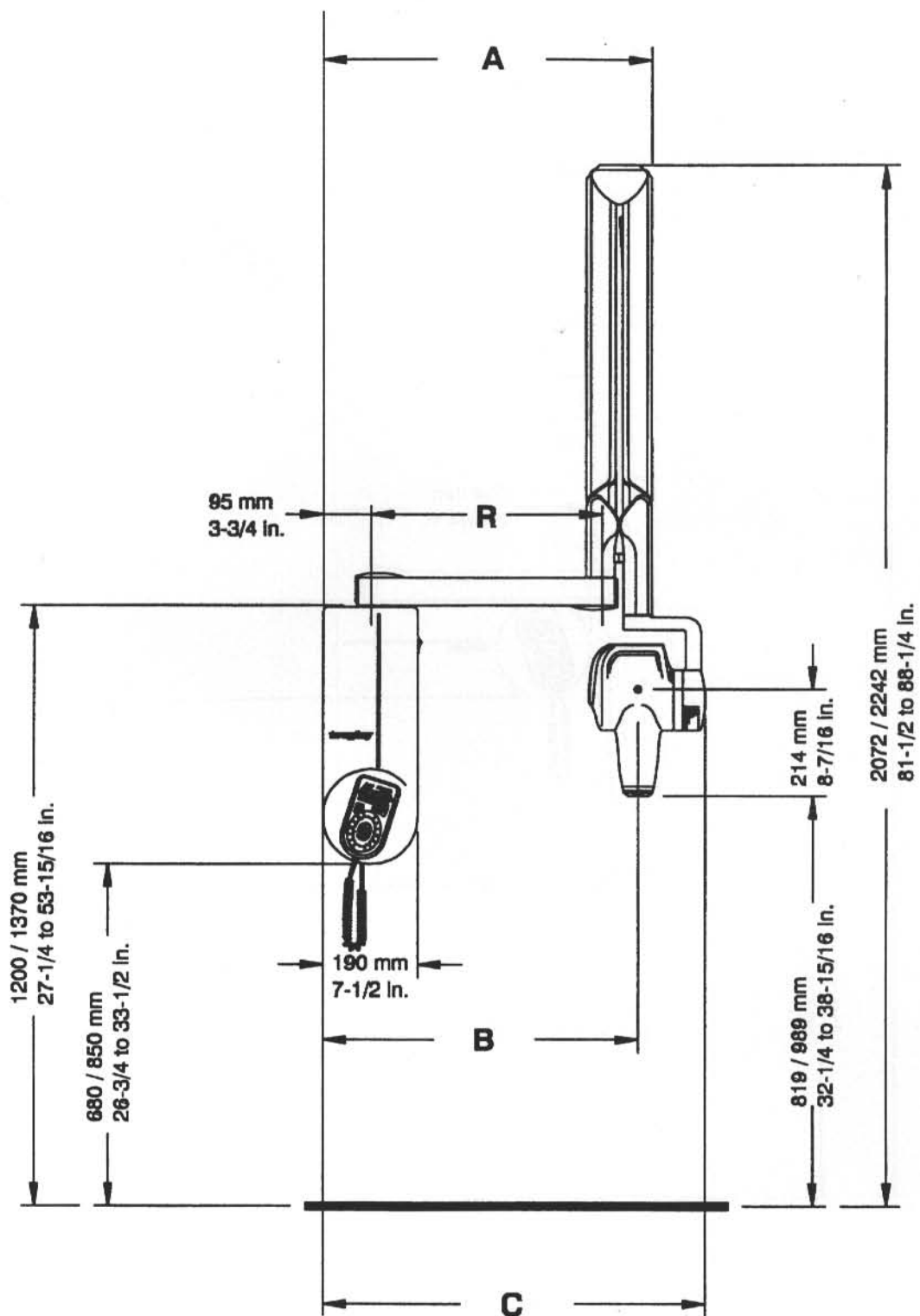
EXTENSION	R	A	B	C
CG645	470 mm (18-1/2 in.)	651 mm (25-5/8 in.)	622 mm (24-1/2 in.)	757 mm (29-13/16 in.)
CG646	648 mm (25-1/2 in.)	829 mm (32-5/8 in.)	800 mm (31-1/2 in.)	935 mm (36-13/16 in.)
CG648	825 mm (32-1/2 in.)	1006 mm (39-5/8 in.)	977 mm (38-1/2 in.)	1112 mm (43-3/4 in.)



Space requirements - left installation

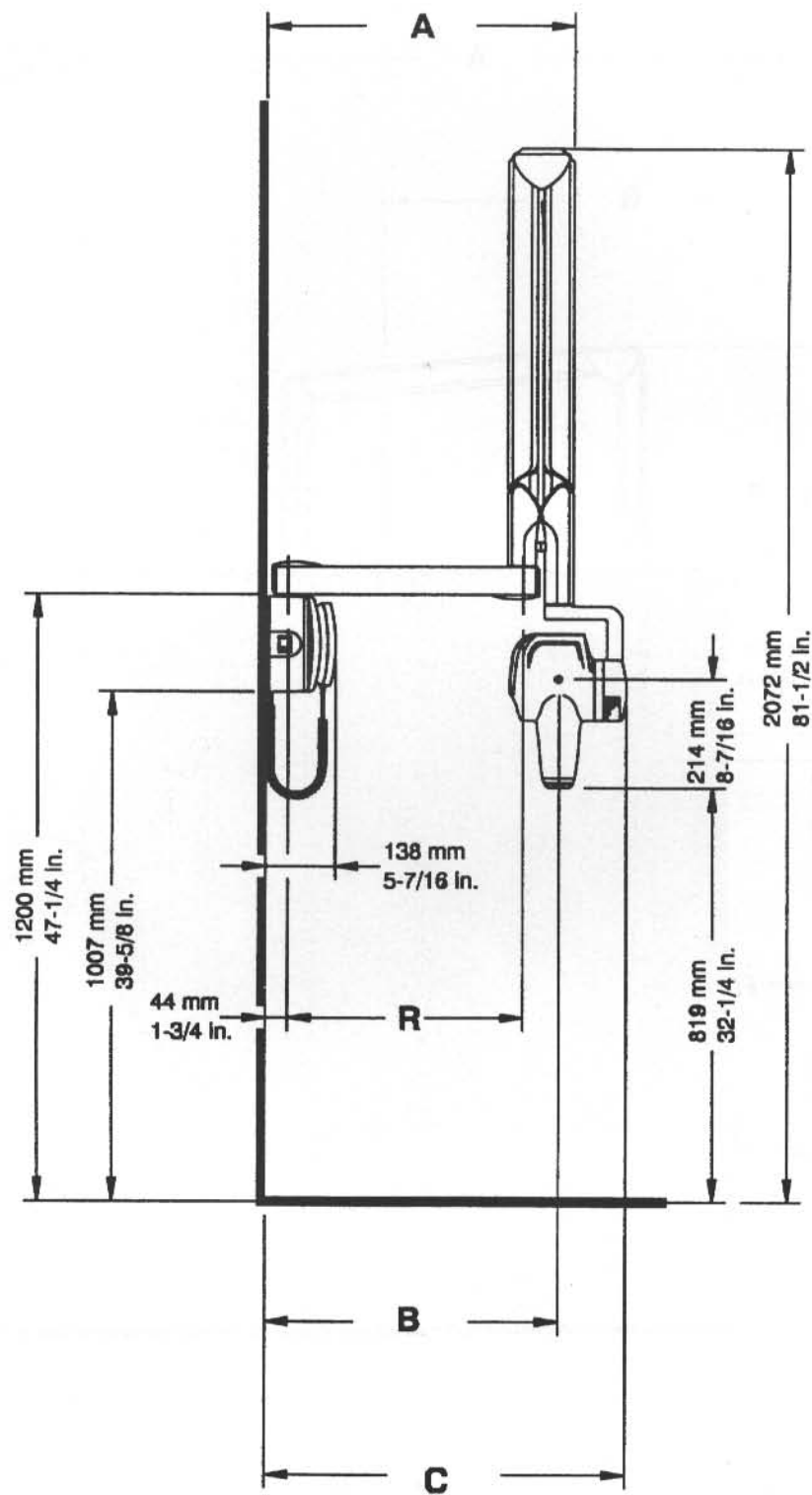
EXTENSION	R	A	B	C
CG645	470 mm (18-1/2 in.)	651 mm (25-5/8 in.)	622 mm (24-1/2 in.)	757 mm (29-13/16 in.)
CG646	648 mm (25-1/2 in.)	829 mm (32-5/8 in.)	800 mm (31-1/2 in.)	935 mm (36-13/16 in.)
CG648	825 mm (32-1/2 in.)	1006 mm (39-5/8 in.)	977 mm (38-1/2 in.)	1112 mm (43-3/4 in.)





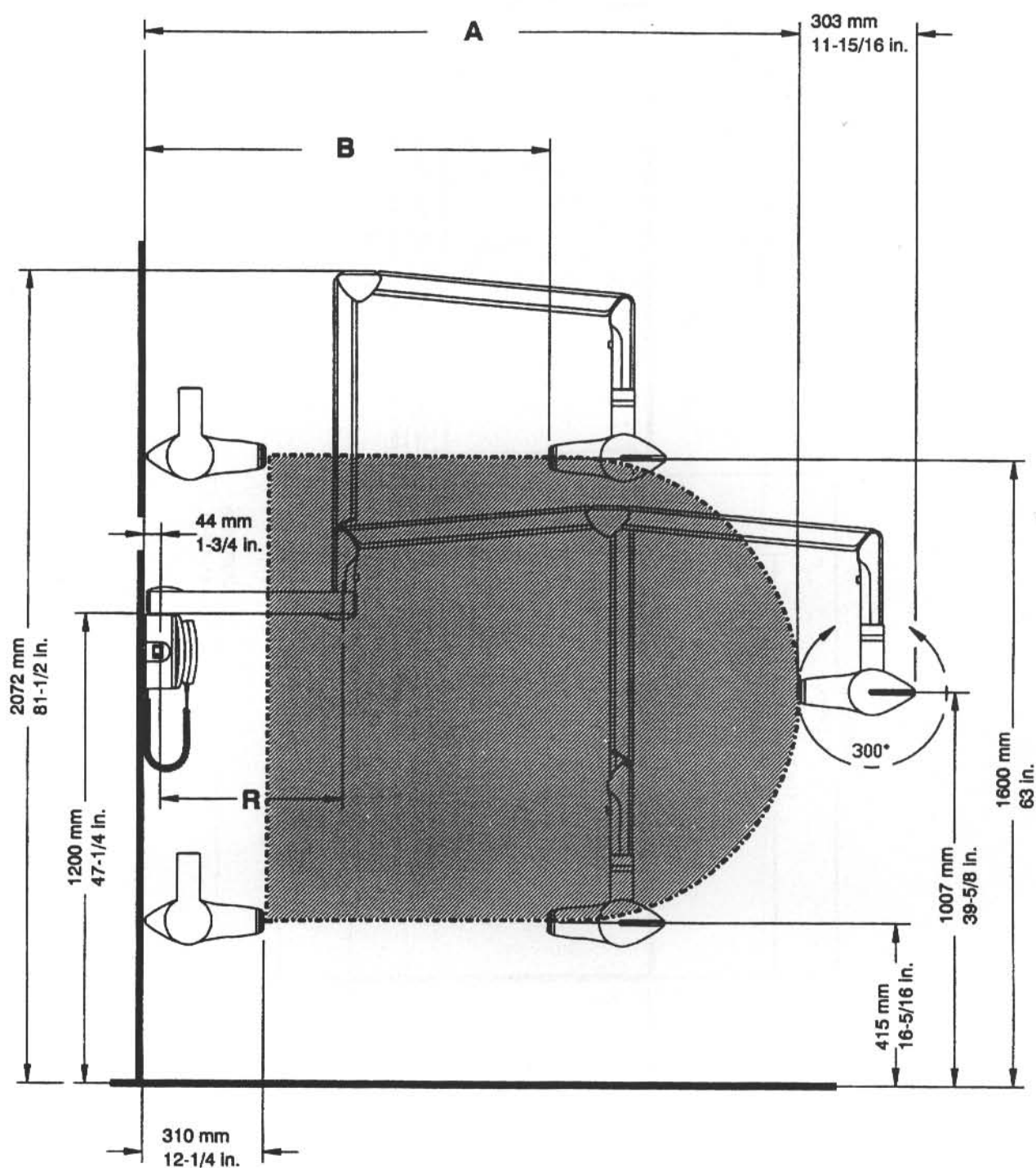
Space requirements - vertical installation

EXTENSION	R	A	B	C
CG645	470 mm (18-1/2 in.)	666 mm (26-1/4 in.)	637 mm (25-1/16 in.)	772 mm (30-3/8 in.)
CG646	648 mm (25-1/2 in.)	844 mm (33-1/4 in.)	815 mm (32-1/16 in.)	950 mm (37-3/8 in.)
CG648	825 mm (32-1/2 in.)	1021 mm (40-3/16 in.)	992 mm (39-1/16 in.)	1127 mm (44-3/8 in.)



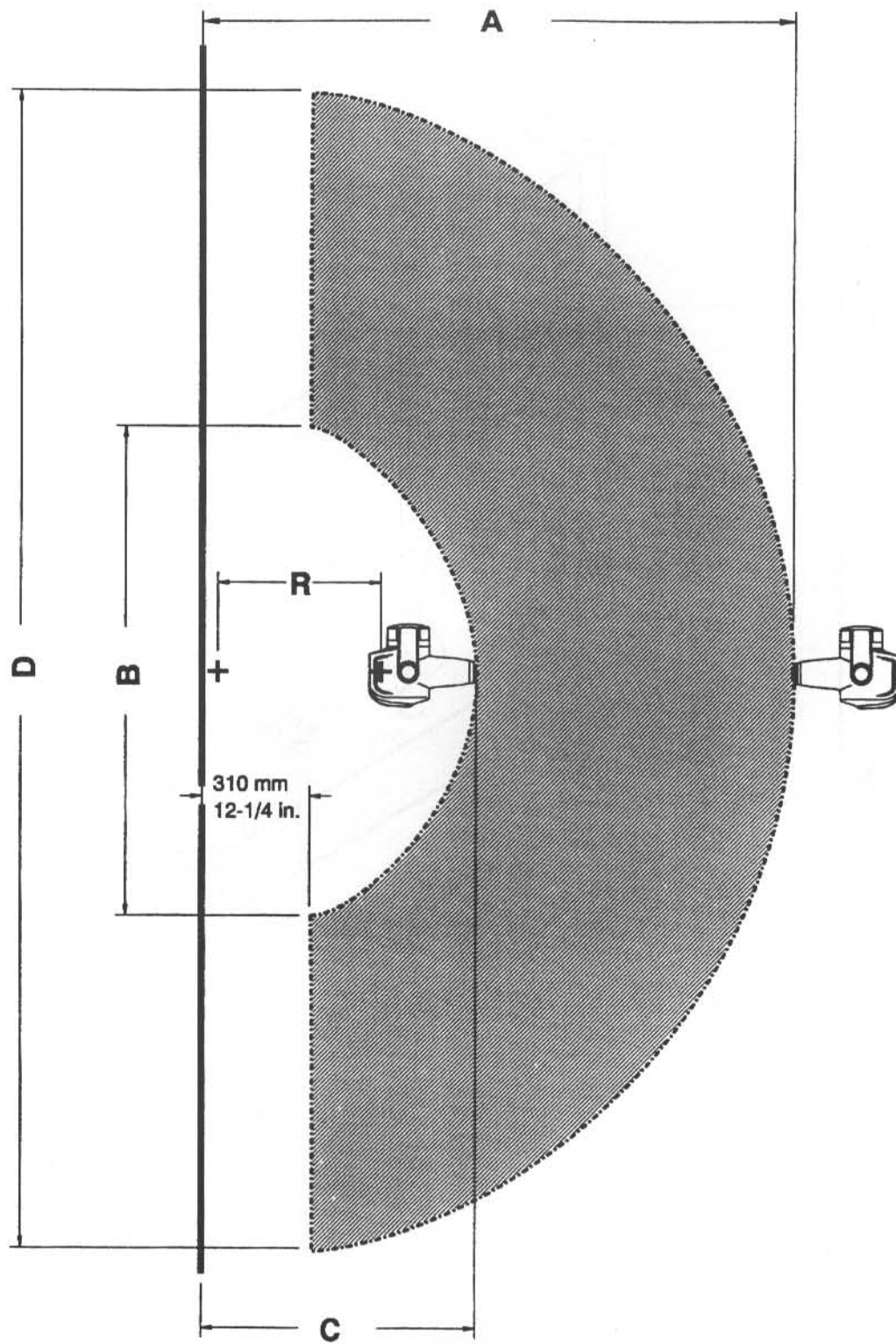
Space requirements - side view

EXTENSION	R	A	B	C
CG645	470 mm (18-1/2 in.)	615 mm (24-1/4 in.)	586 mm (23-1/16 in.)	721 mm (28-3/8 in.)
CG646	648 mm (25-1/2 in.)	793 mm (31-1/4 in.)	764 mm (30-1/16 in.)	899 mm (35-3/8 in.)
CG648	825 mm (32-1/2 in.)	970 mm (38-1/4 in.)	941 mm (37-1/16 in.)	1076 mm (42-3/8 in.)



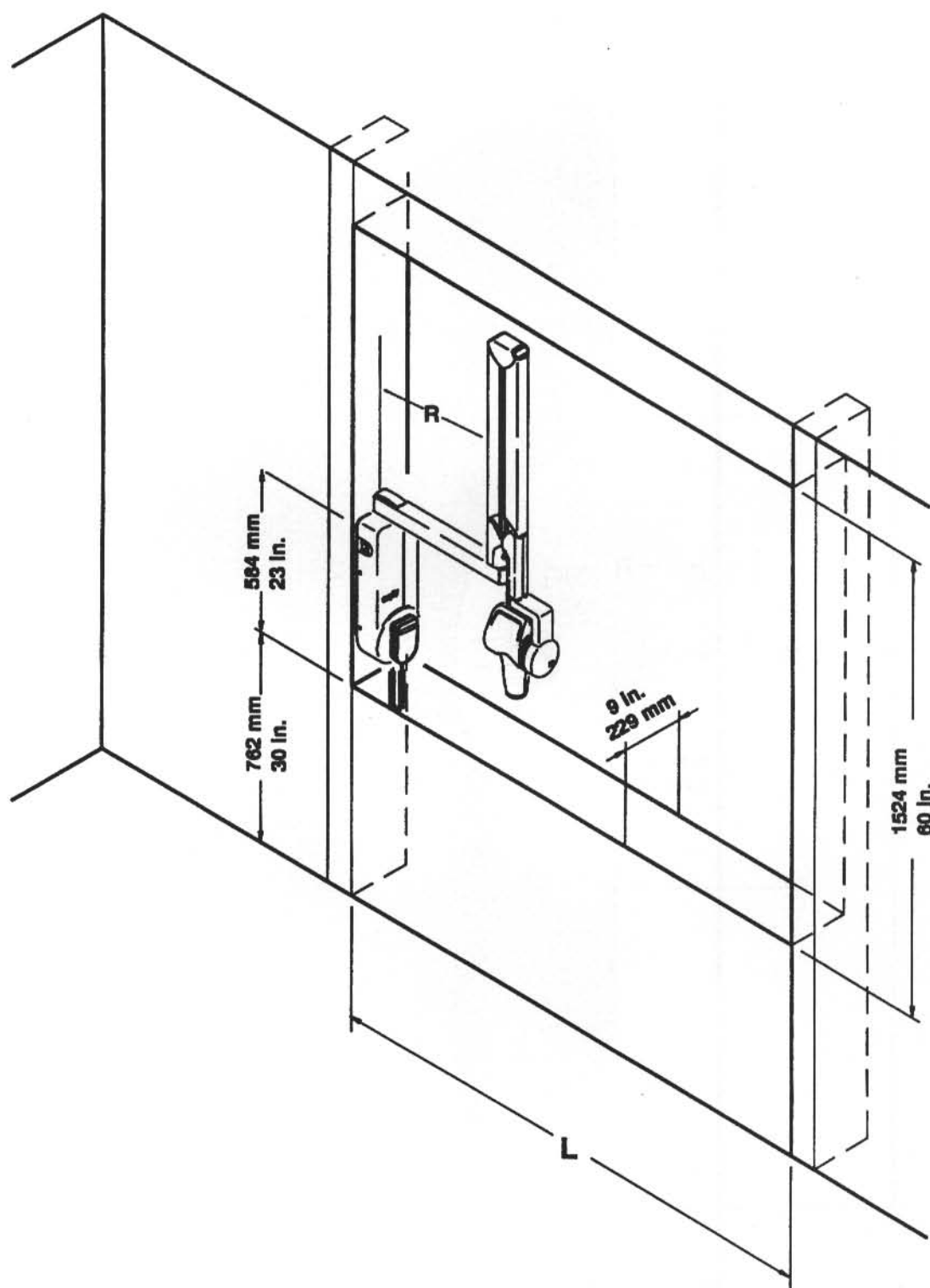
Clearance space - side view

EXTENSION	R	A	B
CG645	470 mm (18-1/2 in.)	1700 mm (67 in.)	1047 mm (41-1/4 in.)
CG646	648 mm (25-1/2 in.)	1880 mm (74 in.)	1225 mm (48-1/4 in.)
CG648	825 mm (32-1/2 in.)	2050 mm (80-3/4 in.)	1402 mm (55-1/4 in.)



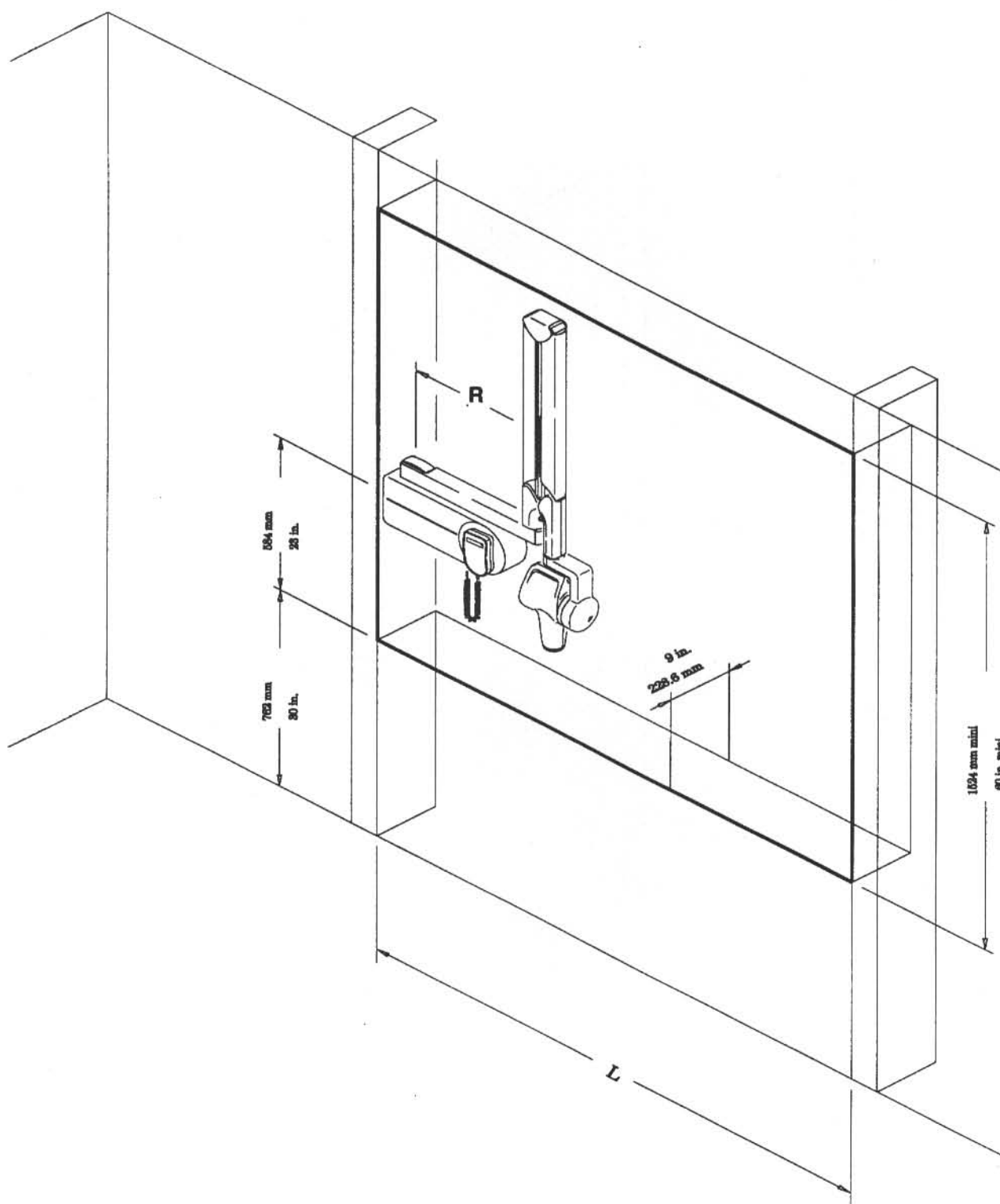
Clearance space - underneath view

EXTENSION	R	A	B	C	D
CG645	470 mm (18-1/2 in.)	1700 mm (67 in.)	1383 mm (54-7/16 in.)	785 mm (30-15/16 in.)	3257 mm (128-1/4 in.)
CG646	648 mm (25-1/2 in.)	1880 mm (74 in.)	1758 mm (69-1/4 in.)	963 mm (37-15/16 in.)	3617 mm (142-7/16 in.)
CG648	825 mm (32-1/2 in.)	2050 mm (80-3/4 in.)	2126 mm (83-11/16 in.)	1140 mm (44-7/8 in.)	3975 mm (156-1/2 in.)



Installation for two seats

EXTENSION	R	L
CG645	470 mm (18-1/2 in.)	821 mm (32-5/16 in.)
CG646	648 mm (25-1/2 in.)	1000 mm (39-3/8 in.)
CG648	825 mm (32-1/2 in.)	1176 mm (46-5/16 in.)



### Installation for pass through (CL045)

EXTENSION	R	L
CG645	470 mm (18-1/2 in.)	821 mm (32-5/16 in.)
CG646	648 mm (25-1/2 in.)	1000 mm (39-3/8 in.)
CG648	825 mm (32-1/2 in.)	1176 mm (46-5/16 in.)













4, rue F. Pelloutier - Croissy-Beaubourg  
77437 MARNE-LA-VALLÉE Cédex 2 FRANCE  
Ph. : + 33 1 64 80 85 00 - Fax : + 33 1 64 80 85 85  
Site Internet : <http://www.trophy-imaging.com>  
E-mail : [customer-service@trophy-imaging.com](mailto:customer-service@trophy-imaging.com)

TROPHY BÉNÉLUX	30, avenue des Nymphes - Centre Cial Les Dauphins B 1410 - WATERLOO Ph. : + 32 2 354 15 28 / 68 74 - Fax : + 32 2 353 04 60
TROPHY ESPAÑA S.L.	Calle Pilar de Zaragoza, 15 28028 MADRID Ph. : + 34 91 355 88 09 - Fax : + 34 91 356 89 82
TROPHY GERMANY GmbH	Gerbereistr. 7 D 77694 KEHL-KORK RHEIN - GERMANY Ph. : + 49 78 51 93 970 - Fax : + 49 78 51 939 730
TROPHY ITALIA spa	Via Guarenti, 4 20035 - LISSONE (MI) Ph. : + 39 0 39 27 80 864 / 877 - Fax : + 39 0 39 27 80 889
TROPHY RADIOLOGY (UK) Ltd	Unit 3, Block B, Connaught, Business Centre 9, Malham Rd, Forrest Hill LONDON, S.E. 23 1AH/UK Ph. : + 44 1 81 291 99 09 - Fax : + 44 1 81 291 98 00
TREX TROPHY DENTAL DIVISION	37 Apple Ridge Road DANBURY, CT 06810 USA Ph. : + 1 203 207 - 45 45 - Fax : + 1 203 207 - 45 46
TROPHY JAPAN	TOKYO-TO MINATO-KU Toranomon 1-23-7 Toranomon 23 Mori Building JAPAN Ph. : + 81 3 35 80 68 81 - Fax : + 81 3 35 80 68 83



**INTRA-ORAL X-RAY SYSTEM**

***ELITYS®***

**HIGH FREQUENCY TECHNOLOGY**

**USER'S MANUAL**

**CAUTION**

**Federal law restricts this device to sale by or  
on the order of a dentist.**

Trophy Radiology constantly strives to improve its products and, therefore, reserves the right to deliver, without prior notice, machines whose characteristics differ from those described here; nonetheless, these machines are still guaranteed to comply with regulations in force. All rights reserved.

# Table of Contents

<b>SAFETY AND PROTECTION</b>	<b>1</b>
<b>DESCRIPTION OF THE SYSTEM</b>	<b>3</b>
<b>USE OF THE UNIT</b>	<b>4</b>
I. PATIENT POSITIONING	4
II. GENERATOR POSITIONING	4
Paralleling technique	4
Bisecting technique	4
III. FILM POSITIONING	5
Bisecting technique	5
Paralleling technique	6
Occlusal pictures	7
Bitewing pictures	7
IV. PREPARING THE CONTROL UNIT AND TAKING THE EXPOSURE	9
V. ADDITIONAL CHARACTERISTICS OF THE RADIOLOGY UNIT	10
<b>DEVELOPING THE FILMS</b>	<b>11</b>
I. AUTOMATIC	11
II. MANUAL	11
Main reasons for poor X-rays	11
<b>TECHNICAL CHARACTERISTICS</b>	<b>12</b>
I. TECHNICAL CHARACTERISTICS ACCORDING TO IEC STANDARD 601-2-7	12
II. MAIN CHARACTERISTICS OF THE X-RAY GENERATOR	14
III. TABLE OF EXPOSURE TIMES ACCORDING TO THE PROGRAMMES SELECTED	16
IV. CHOICE OF FILM TYPE TO USE	18
V. CORRECTION OF EXPOSURE TIMES FOR EACH FILM TYPE	18
<b>PREVENTIVE MAINTENANCE</b>	<b>19</b>
ERROR MESSAGES	21
CANCELLING THE DIFFERENT ERROR MESSAGES	21
TROUBLE-SHOOTING HINTS	22

Original language of document: FRENCH

## WARRANTY CONDITIONS

It is the responsibility of the user to comply with current legislation concerning installation and operation of the equipment.

In the event of incorrect use or defective maintenance not complying with the recommended scheme, TROPHY RADIOLOGIE or its representative shall not be liable for any deficiencies, physical damage, personal injuries or non conformity that may occur as a result.

The equipment must not be used if electrical, mechanical or radiation protection components are defective, or if the operations stipulated by the maintenance programme have not been carried out.

Only TROPHY RADIOLOGIE or third parties duly authorized by TROPHY RADIOLOGIE may carry out modifications or add extensions to the installation and equipment.

Such modifications shall always be carried out in compliance with the regulations in force in the country of operation, and in compliance with normal trade practice.

If the power supply characteristics do not comply with the recommendations given in the Installation and Maintenance Manual section 4 Chapter II "Prior to Installation", the **ELITYS®** unit will not be able to provide maximum performance, and it will not be possible to guarantee normal operation.

You can obtain a complete technical file about the **ELITYS®** unit by simply requesting it from TROPHY RADIOLOGIE.

## TRANSPORTATION CONDITIONS

The goods are transported at the consignee's risk.

Any disputes as to losses or damage occurring during transportation must be stated in the presence of the haulier upon delivery, and must be noted on the delivery slip.

Under no circumstances shall packaging materials manufactured by TROPHY RADIOLOGIE be used for any other purposes than transportation.

## SAFETY AND PROTECTION

You have just purchased a TROPHY **ELITYS**® intra-oral X-ray system. We congratulate you on your choice, and are sure you will be fully satisfied with its use and diagnostic capabilities.

TROPHY radiology units offer high quality and advanced technology.

We recommend reading this manual carefully before using your unit, to become familiar with its operation and make the most of its performance.

Keep this manual in a safe place so that you can easily refer to it in the future.

X-rays are not innocuous and can be dangerous if used badly. You must, therefore, take precautions even when following the instructions in this manual.

X-ray units manufactured by TROPHY comply with the strictest safety standards in force throughout the world (Europe, Japan, USA, etc.). They guarantee optimum protection against radiation risks.

Nonetheless, you are handling a unit specifically designed to generate X-rays to allow medical diagnosis on a film or using RVG (a dental digital imaging system). Consequently, despite the inherent safety of our equipment, we recommend using conventional commercially-available equipment to protect yourself and your patient against scattered radiation risks.

In addition, it is vital that the assembly, extensions, adjustments, modifications and repairs be carried out by an authorized TROPHY distributor. Also, your radiology unit must be installed in premises that comply with IEC provisions and the standards in force.

In the event of failure to comply with these instructions TROPHY shall not be held responsible for the safety, reliability and characteristics of the machine.

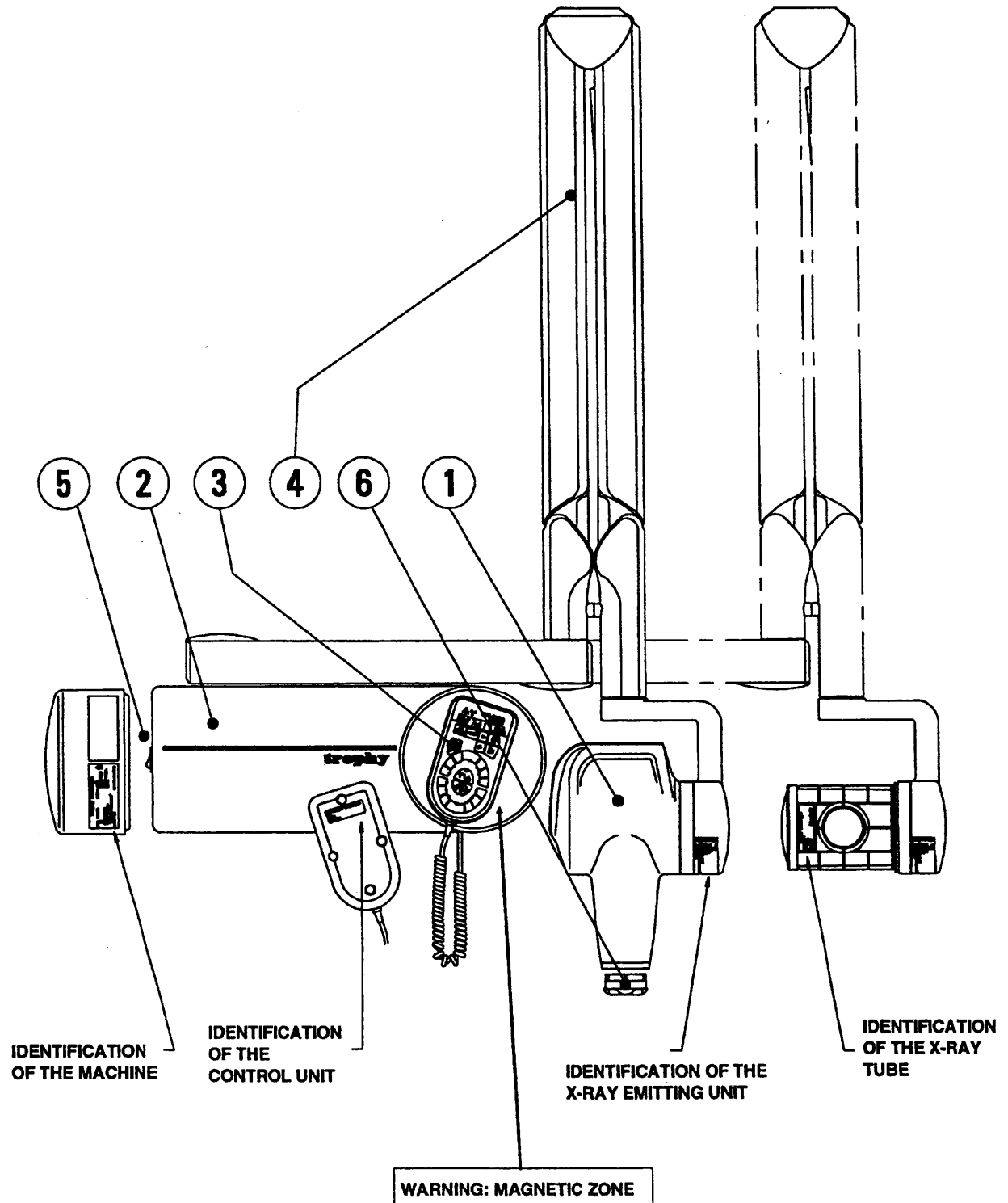
Your distributor will be pleased to help you with the initial use of your unit and to answer any subsequent questions you may have.

Thank you for placing your confidence in TROPHY RADIOLOGIE.

The signs "Warning" and "Ionising radiation" fixed to the front panel of the control unit mean "WARNING IONISING RADIATION".





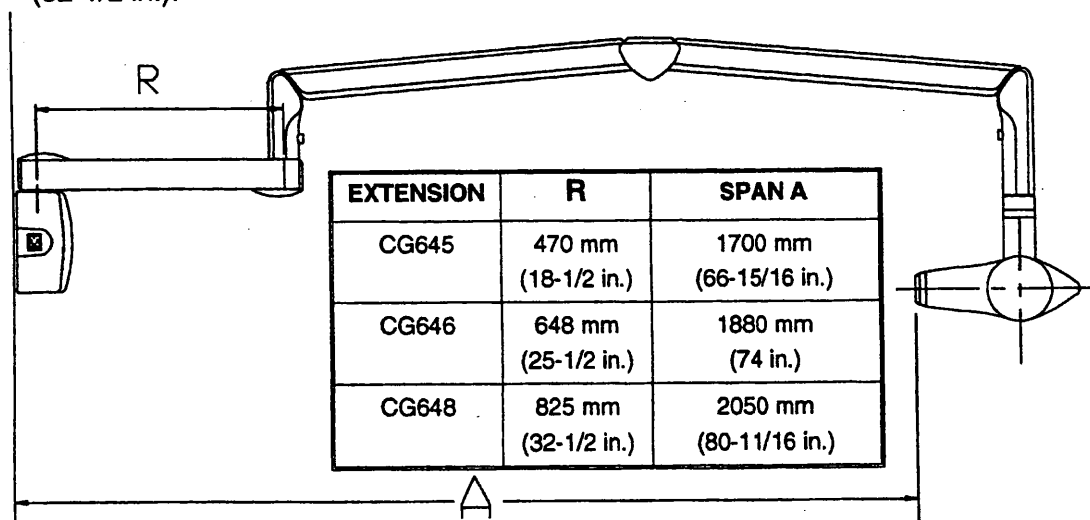


## DESCRIPTION OF THE SYSTEM

Your intra-oral radiology unit is made up of:

- ① A high frequency X-ray generator comprising:
  - > a transformer and associated electronics, and an oil-bathed X-ray emitting tube
  - > a beam limiting device that limits radiation to a diameter of approximately 6 cm (2-3/8 in.) on the skin and ensures a distance of 20 cm (7-7/8 in.) between the skin and the X-ray focal spot.
  - > an angle scale and a handle to facilitate positioning
- ② A wall framework containing the high frequency generator's control electronics designed to support its mechanical stand.
- ③ A control unit for the X-ray generator, with the following features:
  - > anatomical selection and digital display of parameters (kV, mA, exposure time)
  - > a self-test of the microprocessor each time the unit is activated
  - > an alarm in the event of incorrect operation
  - > an RVG key that automatically adjusts the exposure parameters (time and mA) if you are using an RVG (RadioVisioGraphy)
- ④ A scissor arm:
 

The scissor arm makes it possible to position the generator easily and precisely. It is wall-mounted with an extension of 470 mm (18-1/2 in.), 648 mm (25-1/2 in.) or 825 mm (32-1/2 in.).



- ⑤ On/off switch with built-in light

### ❑ Options

- > Separate control unit
- > Rectangular collimator ⑥, dimensions 41 x 32 mm (1-5/8 x 1-1/4 in.)
- > Separate radiography control button

# USE OF THE UNIT

## I. PATIENT POSITIONING

The patient should preferably be seated with the sagittal plane vertical (figure 1).

- Radiography of the upper maxillary: the nose-ear plane must be horizontal
- Radiography of the lower maxillary: the occlusal plane must be horizontal

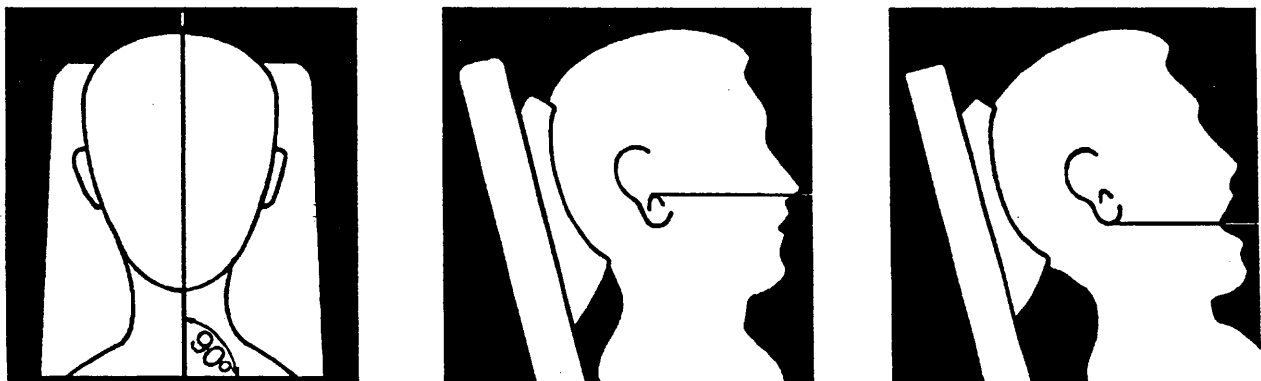


FIGURE 1 : PATIENT POSITIONING

## II. GENERATOR POSITIONING

The scissor arm allows the generator to be accurately positioned for any type of exposure. The beam limiting device maintains a distance of at least 20 cm (7-7/8 in.) between the focal spot and the skin. Subsequently, either the paralleling technique (figure 2), or the bisecting technique (figure 3) can be used.

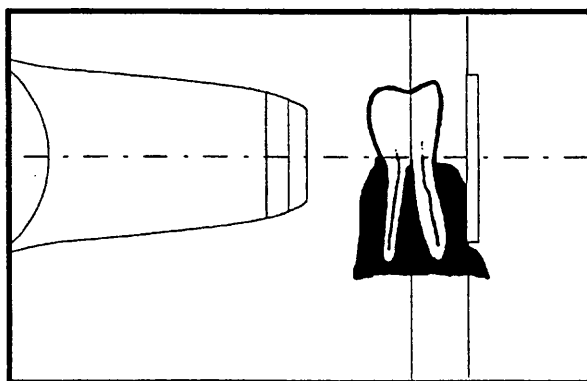


FIGURE 2 : PARALLELING TECHNIQUE

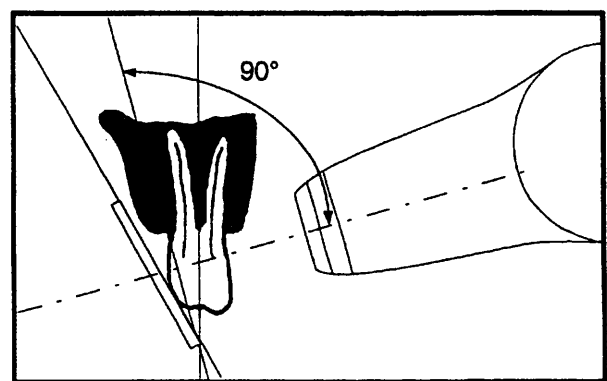


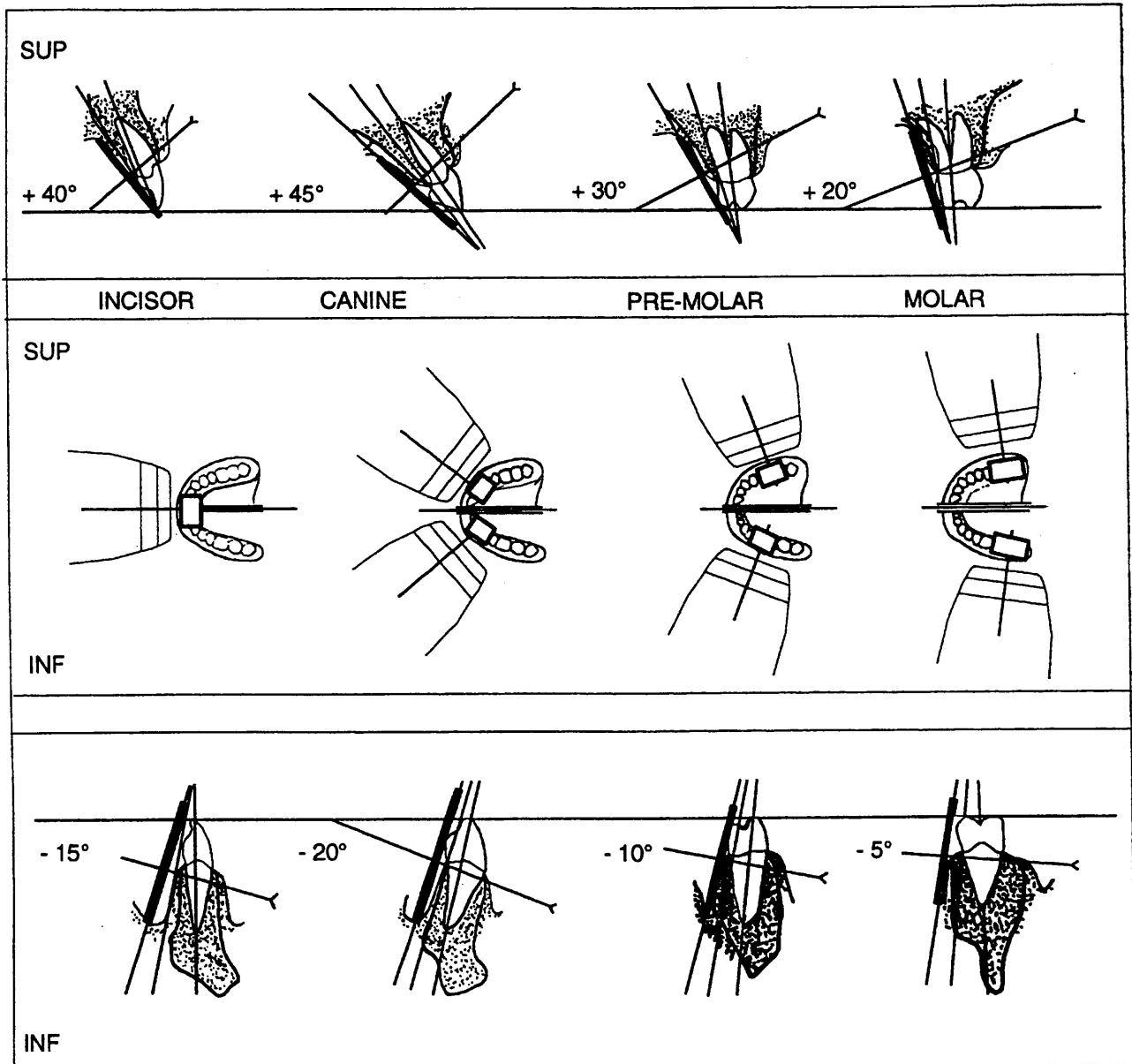
FIGURE 3 : BISECTING TECHNIQUE

### III. FILM POSITIONING

Place the face of the film with no label against the area to be examined.

❑ **Bisecting technique:**

Place the film and generator as shown in figure 4 (the beam is perpendicular to the line which bisects the angle between the tooth and film). The patient holds the film in position with his thumb, keeping his other fingers out of the beam.

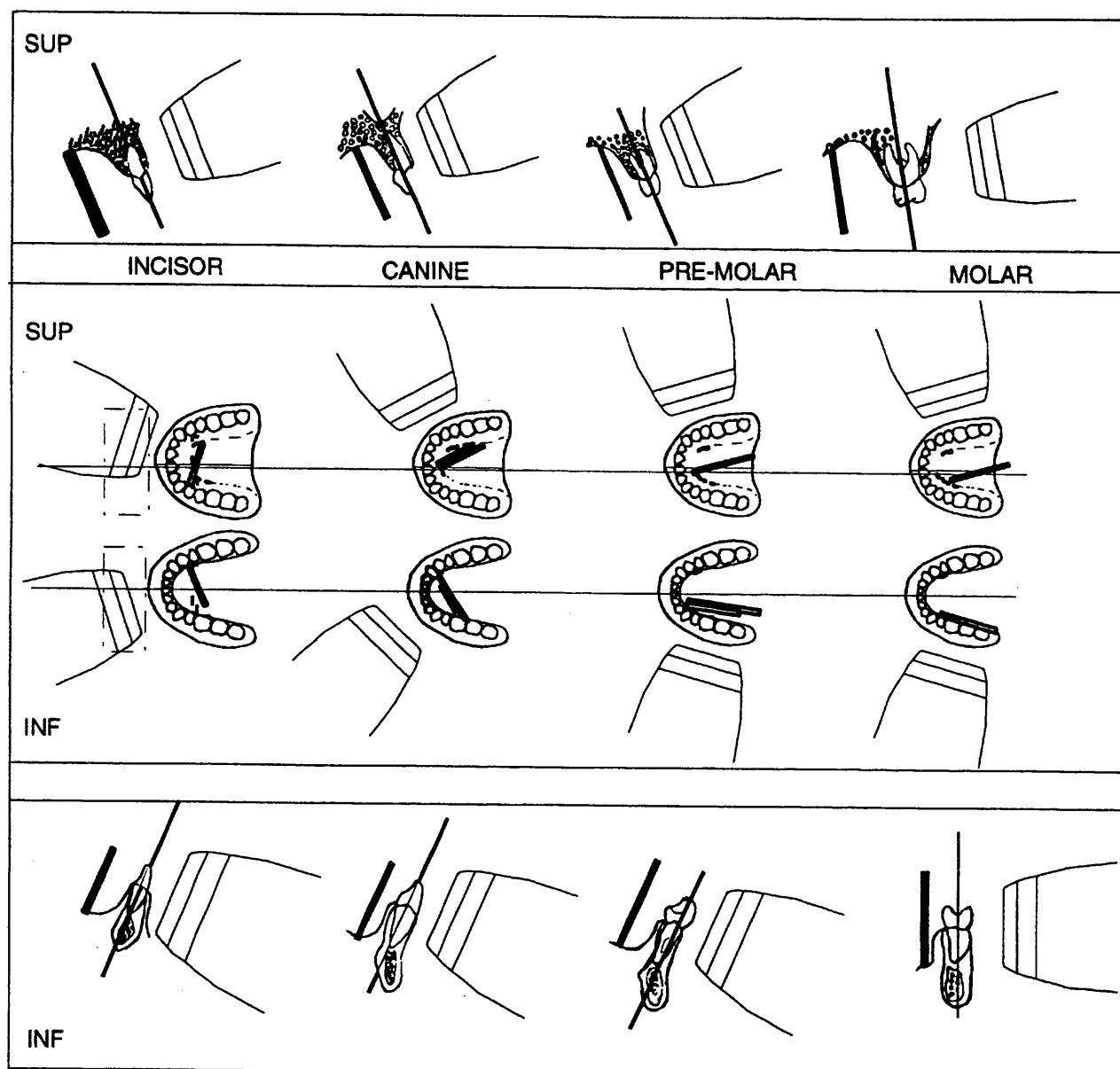


**FIGURE 4 : FILM POSITIONING**

*Bisecting technique*

❑ **Paralleling technique:**

Place the film and generator as shown on figure 5 (the beam is perpendicular to the film). In this case, a film-holder should be used.

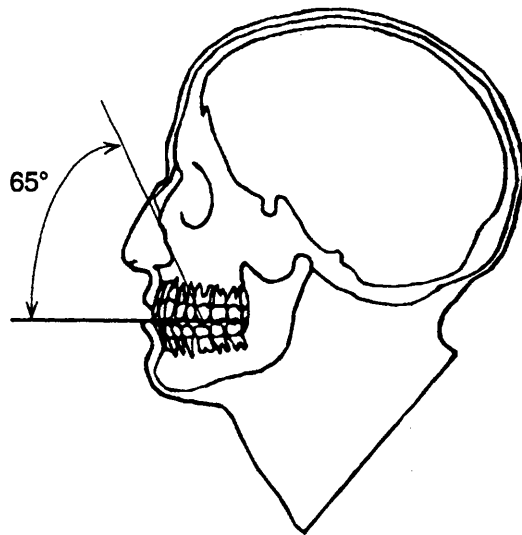


**FIGURE 5 : FILM POSITIONING**

*Paralleling technique*

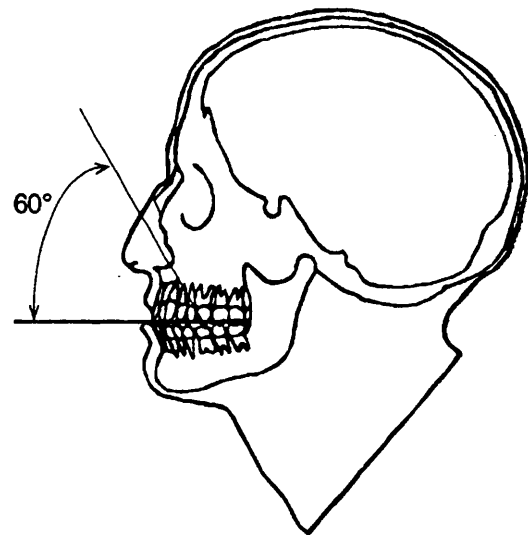
□ Occlusal films

INCISOR

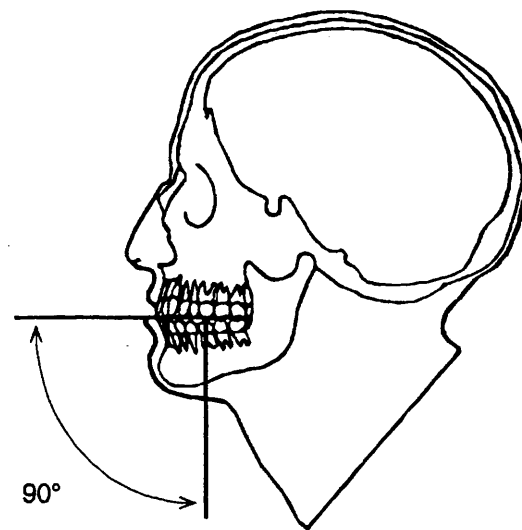


SUP

MOLAR



OCCLUSAL



INF

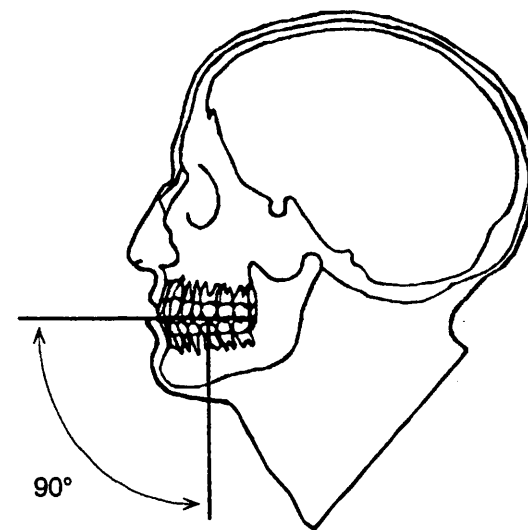
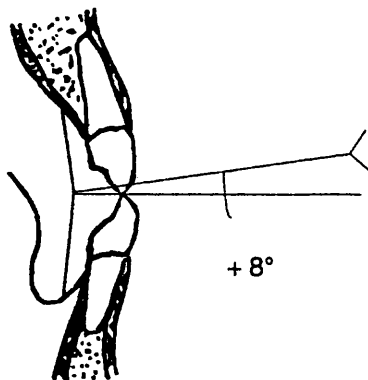


FIGURE 6 : FILM POSITIONING

Occlusal pictures

□ Bitewing films



BITEWING

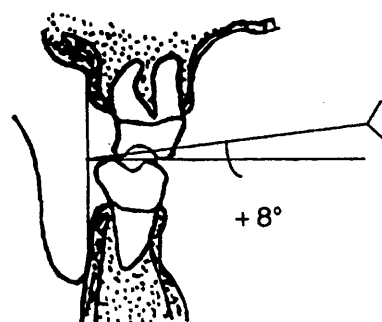


FIGURE 7 : FILM POSITIONING

Bitewing pictures

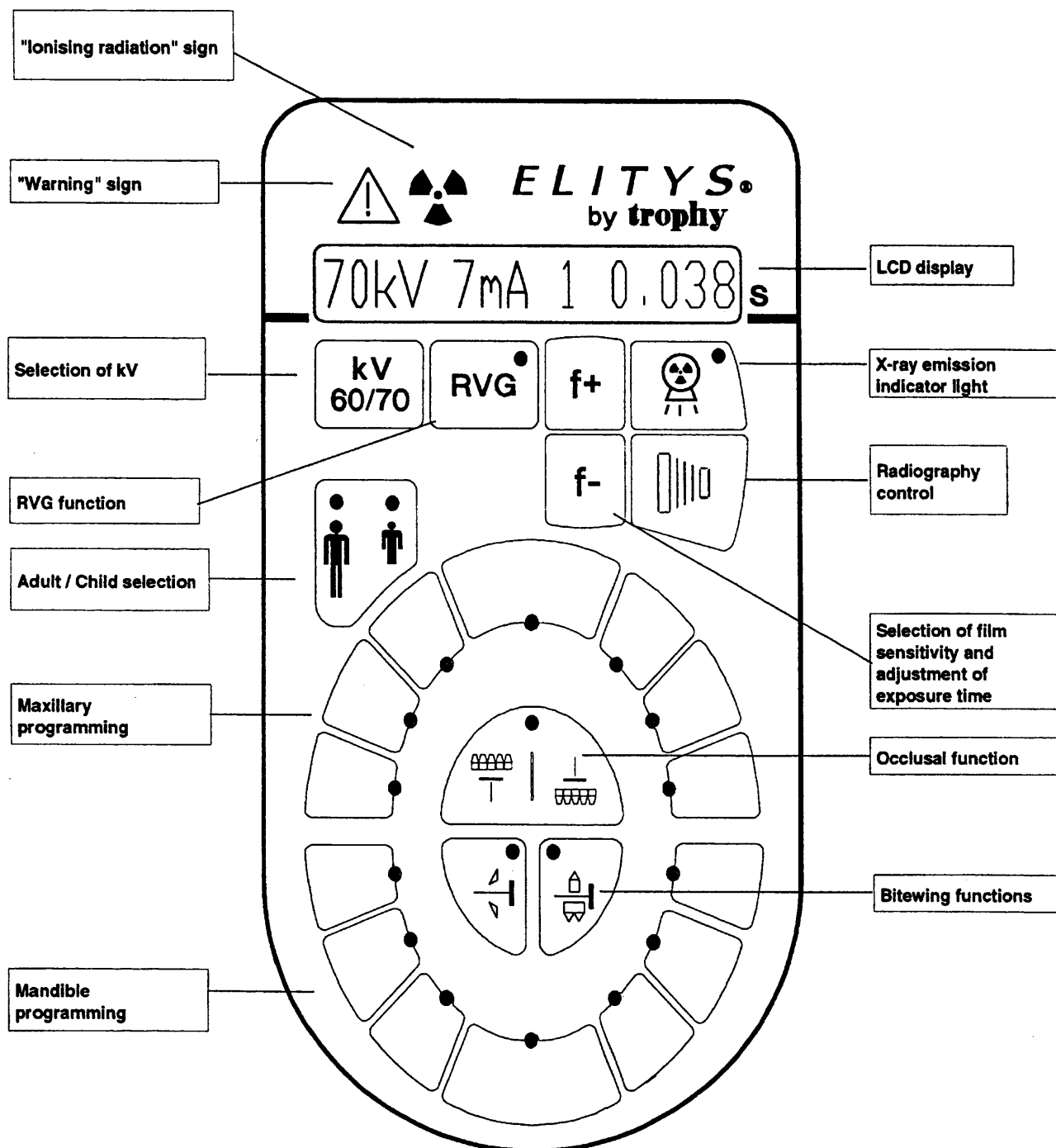


FIGURE 8 : CONTROL UNIT

#### IV. PREPARING THE CONTROL UNIT AND MAKING THE EXPOSURE

- ❑ When you activate the machine (using On/Off switch ⑤ page 2), the "on" button as well as the following displays light up:
  - the tooth or special exposure selector (Bitewing or Occlusal)
  - the child or adult selector
  - the display unit showing all the exposure parameters: kV, mA, type of film used and exposure time
  
- ❑ Programme the generator using the control unit:
  - Select the exposure mode (RVG or film) depending on the equipment used.  
The display indicates:
    - 7 mA for film
    - 4 mA for RVG
  
  - Select the type of film using table IV page 18.  
You can use the same selector to take account of the patient's size:
    - large patient (risk of under-exposed exposure): increase the film sensitivity
    - small patient (risk of over-exposed exposure): reduce the film sensitivity
  
  - Select the kV value:
    - 60 kV for an exposure with strong contrast
    - 70 kV for an exposure with more levels of grey (e.g. periodontal work)
  
  - Select the type of patient: child or adult
  - Select the tooth or exposure to carry out. The unit displays the exposure time automatically calculated by the microprocessor.
  
- ❑ Making an exposure:
  - Press the radiography control key. The X-ray emission indicator lights up and an audible signal is emitted.
  - Keep pressing until the X-ray emission light goes out and the audible signal stops.

---

#### WARNING:

If you stop pressing the control key before the exposure ends, a manipulator alarm will be activated. It indicates the X-ray emission was interrupted prematurely and that there is a risk the exposure may be under-exposed. The digital display alternates between display of "OP. ERROR" and the amount of selected time not used. You can stop the alarm by selecting a tooth again on the control unit.

---



## V. ADDITIONAL CHARACTERISTICS OF THE RADIOLOGY UNIT

- ❑ **ELITYS®** uses a high frequency technology which has several advantages compared to standard systems.
  - Exposure times are shorter, reducing the risk of the patient or film moving during exposure, especially for children and the elderly.
  - The X-ray dose the patient receives is reduced by between 20 and 30%, because **ELITYS®** does not emit soft rays absorbed by the patient that do not contribute to the radiological picture.
- ❑ The choice of high voltage between 60 kV and 70 kV:
  - 60 kV for strong contrast exposures giving a clear image of the endodontal instruments or clearly showing up tooth decay
  - 70 kV for better reproduction of levels of grey (soft tissue), useful for periodontal work.
- ❑ The system provides a thermal safety device. After each exposure, this device prevents the next exposure from taking place for a period calculated on the basis of the most recent exposures and the time elapsed between them. This prevents the generator from over-heating and increases operating life.

During normal use the user will not be concerned by this function. It is only when several long exposures are carried out in succession that the device will go on standby while the generator cools (the key for the selected tooth flashes on the control unit and the display unit indicates "**COOLING**"). An audible signal is emitted during the cooling period. A (bimetal) thermal circuit breaker cuts off the generator at 65 °C.
- ❑ While the exposure is being taken, the exposure time counts off on the control unit display.

If the exposure is interrupted (e.g. by releasing the key) the manipulator alarm (visual and audible) is activated and the remaining exposure time is displayed. This information makes it easier to decide whether to develop the film or to start another exposure. (If the remaining time is short you can proceed with development).

To stop the manipulator alarm select a tooth or a special exposure (Bitewing or Occlusal).
- ❑ The system comprises a self-test function which is activated as follows:
  - switch the machine off,
  - press the RVG key while simultaneously switching the machine on,
  - as soon as the first light comes on, release the RVG key.

The system will test all the control unit's lights one by one, except the X-ray emission light. The audible alarm and display unit are also tested.

At the end of this test, the number of exposures carried out since the machine was put into operation is displayed.

A short beep indicates the test has ended.

To return to normal operation, select any tooth key

## DEVELOPING THE FILMS

---

### I. AUTOMATIC

Refer to the user's manual for your developing machine.

### II. MANUAL

Care must be taken in developing films to obtain good quality X-rays.

- ① Remove the film from its package in a darkroom, taking care to avoid fingerprints or nail marks.
- ② Dip in a developer bath and agitate slightly for a few seconds; leave it in the bath for 5 min at 20°C, 6 min at 18°C, or 4 min at 22°C.
- ③ Rinse it in running water for approx. 20 seconds.
- ④ Dip it in the fixer bath, agitating it for a few seconds and then leave it for at least 5 min in the bath.
- ⑤ Wash it in running water. Wash the film for quite some time to ensure it can be correctly conserved.
- ⑥ Allow it to dry in dry open air, protected from dust.

Steps ⑤ and ⑥ can be done in normal daylight.

It is important to use fresh baths with the correct concentration; do not add developer to increase the bath concentration, since this will increase the contrast but reduce sharpness.

### MAIN REASONS FOR POOR X-RAYS

FILM	Exposure time	Development time	Bath quality	Position
Under-exposed	too short	too short	too cold	
Over-exposed	too long	too long	too hot	
Insuff. detail		too short	too cold or oxidised	
Fuzzy				the patient moved
Off-center				poor positioning
Distortion of the picture				incorrect tubehead or film positioning

# TECHNICAL CHARACTERISTICS

---

## I. TECHNICAL CHARACTERISTICS ACCORDING TO IEC STANDARD 601-2-7

### Manufacturer

TROPHY RADIOLOGIE  
4, rue F. Pelloutier - Croissy-Beaubourg  
77437 MARNE-LA-VALLÉE CEDEX2 - FRANCE

### Models

Dental X-ray diagnosis devices, class 1, type B, intermittent use.

**ELITYS®-TR**: equipped with tube TRX 708 from TROPHY RADIOLOGIE

**ELITYS®-C**: equipped with tube OCX / 65-G from CEI

### Electric power supply

230 - 240 V AC ( $\pm 10\%$ ), 50 Hz, 5 A, apparent resistance 0,5  $\Omega$

100 - 110 - 130 V AC ( $\pm 10\%$ ), 50/60 Hz, 10 A, apparent resistance 0,2  $\Omega$

### Rated high voltage and maximum corresponding current

- film mode	70 kV, 7 mA
- RVG mode	70 kV, 4 mA

### Current/voltage combinations for a maximum output power of

- 490 W in film mode	70 kV/7 mA
- 280 W in RVG mode	70 kV/4 mA

### Rated power for exposure time of 0.1 s

- film mode	490 W
- RVG mode	280 W

### Rate of use

At 70 kV, 7 mA and 0.1 s and at  
the maximum tank temperature: one exposure every 8 seconds.

### Minimum value of the current/time product in the range of conformity:

0.14 mAs at 7mA  
0.08 mAs at mA

**Selection of parameters**

- film mode	70 kV / 7 mA 60 kV / 7 mA
- RVG mode	70 kV / 4 mA 60 kV / 4 mA

**Area of conformity to the IEC standard 601-2-7**

- Reproducibility of the emitted radiation	conform
- Linearity of the emitted radiation	conform
- Precision in radiography	conform

**Measurement conditions**

- kV:	direct measurement using the resistance chain voltmeter method (divider bridge)
- mAs:	direct measurement in the circuit using the mAsmeter
- Exposure time:	direct measurement on the kV signal at 75% of the peak value

**Dimensions and weight**

Control unit	16 x 9 x 4 cm (6-5/16 x 3-1/2 x 1-9/16 in.)	0.4 kg
Wall framework	51.4 x 18.9 x 10.8 cm (20-1/4 x 7-7/16 x 4-1/4 in.)	5.2 kg
X-ray emitting unit	43.8 x 22.6 x 12 cm (17-1/4 x 8-15/16 x 4-3/4 in.)	4 kg
Scissor arm	87.3 x 13.3 x 6.3 cm (34-3/8 x 5-1/4 x 2-1/2 in.)	7.2 kg

**Scissor arm**

The scissor arm is equipped with gas jacks specially designed for this particular application.

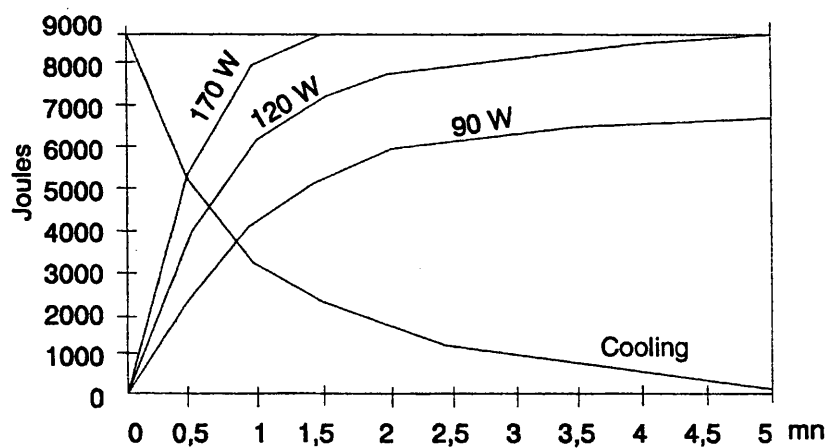
They have been proved to function correctly after more than 400,000 cycles.

**EC conformity marking**

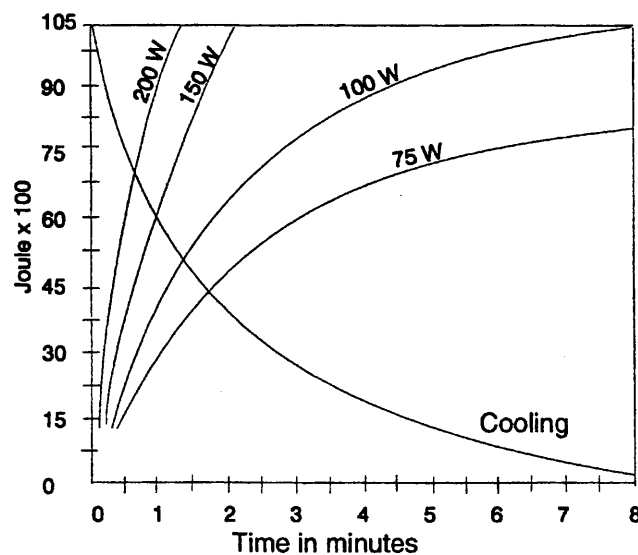
The **ELITYS®** radiology generator complies with the European directive on electro- magnetic compatibility 89/336/EEC. The EC marking on the machine refers only to this directive.

## II. MAIN CHARACTERISTICS OF THE X-RAY GENERATOR

Manufacturer and type of X-ray tube	TROPHY Type TRX 708	CEI Type OCX / 65-G
Rated high voltage	70 kV	70 kV
Rated anodic power	490 W	490 W
Maximum heat accumulated in the anode	8 700 J	10 000 J
Rated value of focal spot (IEC 336/1982)	0.7 mm (.027 ")	0.7 mm (.027 ")
Reference axis for the slope of the target and indicated characteristics of the tube's focal spot	see drawing	see drawing
Target materials	Tungsten	Tungsten
Target slope	19 °	19 °
Filtration due to fixed materials	0.6 mm (.023 ") eq. Al	0.6 mm (.023 ") eq. Al



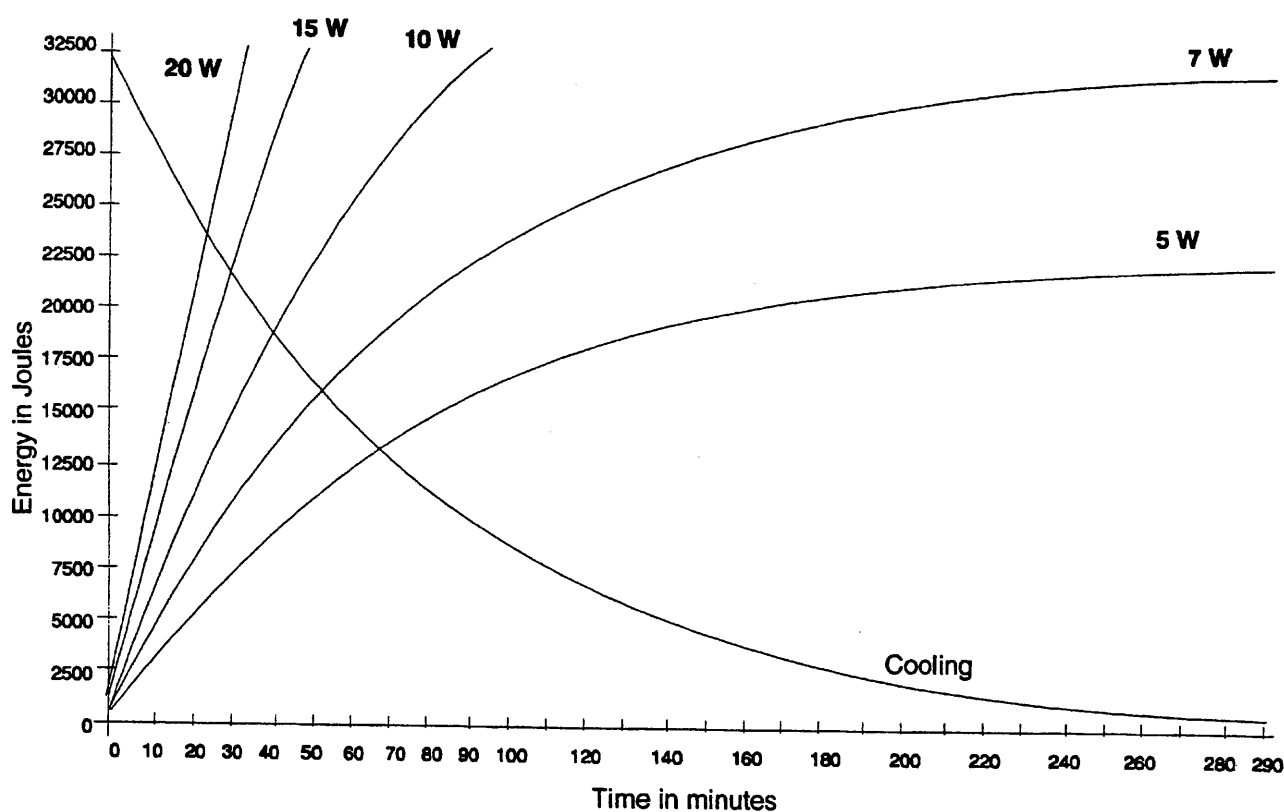
TROPHY tube type TRX 708



CEI tube type OCX / 65-G

**Equipped X-ray generator**

IEC standard 601-2-28	conform
Type of protection against electric shocks	Class I
Degree of protection against electric shocks	Type B
Rated value of inherent filtration	1.5 mm (.059 ") eq. Al
Rated value of additional filtration	1.0 mm (.039 ") eq. Al
Rated value of total filtration	2.5 mm (.098 ") eq. Al
Beam limiting cone, focal spot/skin distance	20 cm (7-7/8 in.)
Maximum accumulated heat	32 500 J
Maximum continuous thermal dissipation	20 W
Leaking radiation for continuous operation at 490 W for one hour (IEC 407/1973)	< 0.25 mGy



Maximum field of symmetrical radiation

6 cm (2-3/8 in.) diameter

**Heating and cooling curves of the ELI  
TYS® tank**

## III. TABLE OF EXPOSURE TIMES ACCORDING TO THE PROGRAMMES SELECTED

PROGRAMME	TOOTH	ANGLE	EXPOSURE TIME in seconds for film type 6 and 7 mA	
			70 kV	60 kV
ADULT MANDIBLE	41 - 42 - 31 - 32	- 15	0.150	0.273
	43 - 44 - 33 - 34	- 20	0.150	0.273
	45 - 46 - 35 - 36	- 10	0.150	0.273
	47 - 48 - 37 - 38	- 5	0.178	0.323
ADULT MAXILLARY	12 - 11 - 21 - 22	+ 40	0.178	0.323
	13 - 14 - 23 - 24	+ 45	0.178	0.323
	15 - 16 - 25 - 26	+ 30	0.232	0.423
	17 - 18 - 27 - 28	+ 20	0.260	0.472
CHILD MANDIBLE	81 - 82 - 71 - 72	- 15	0.075	0.137
	83 - 73	- 20	0.075	0.137
	84 - 74	- 20	0.075	0.137
	85 - 75	- 10	0.089	0.162
CHILD MAXILLARY	51 - 52 - 61 - 62	+ 40	0.089	0.162
	53 - 63	+ 45	0.089	0.162
	54 - 64	+ 45	0.116	0.211
	55 - 65	+ 30	0.130	0.236
BITEWING	canines-incisors	-	0.150	0.273
	molars	-	0.178	0.323
OCCLUSAL	mandible or maxillary	-	0.530	0.964

PROGRAMME	TOOTH	ANGLE	EXPOSURE TIME in seconds for film type 6 and 4 mA	
			70 kV	60 kV
ADULT MANDIBLE	41 - 42 - 31 - 32	- 15	0.088	0.159
	43 - 44 - 33 - 34	- 20	0.088	0.159
	45 - 46 - 35 - 36	- 10	0.088	0.159
	47 - 48 - 37 - 38	- 5	0.104	0.188
ADULT MAXILLARY	12 - 11 - 21 - 22	+ 40	0.104	0.188
	13 - 14 - 23 - 24	+ 45	0.104	0.188
	15 - 16 - 25 - 26	+ 30	0.136	0.247
	17 - 18 - 27 - 28	+ 20	0.151	0.275
CHILD MANDIBLE	81 - 82 - 71 - 72	- 15	0.044	0.080
	83 - 73	- 20	0.044	0.080
	84 - 74	- 20	0.044	0.080
	85 - 75	- 10	0.052	0.094
CHILD MAXILLARY	51 - 52 - 61 - 62	+ 40	0.052	0.094
	53 - 63	+ 45	0.052	0.094
	54 - 64	+ 45	0.068	0.123
	55 - 65	+ 30	0.076	0.138
BITEWING	canines-incisors	-	0.088	0.159
	molars	-	0.104	0.188
OCCLUSAL	mandible or maxillary	-	0.245	0.445



**IV. CHOICE OF FILM TYPE TO USE**

SUPPLIER	MODEL	FILM TYPE
KODAK	Ekta Speed	3
KODAK	Ekta Speed Plus	3
AGFA	Dentus M4	3
DENTAL UNION	Bleu Star	3
AGFA	Dentus M2	5
AGFA	Normal	6
DUPONT	Lightning fast	6
GEVAERT	Dentus Ultra Rapid	6
KODAK	Ultra Speed	6
RINN	Super Fast	6
MINIMAX	Intermediate	8
RINN	Extra Fast	9

**V. CORRECTION OF EXPOSURE TIMES FOR EACH FILM TYPE**

POSITION	CORRECTION	COEFFICIENT
0	- 73 %	0.27
1	- 67 %	0.33
2	- 59 %	0.41
3	- 49 %	0.51
4	- 36 %	0.64
5	- 20 %	0.80
6	0	1
7	+ 25 %	1.25
8	+ 56 %	1.56
9	+ 95 %	1.95

# PREVENTIVE MAINTENANCE

---

To make sure the machine functions correctly, it must undergo an annual servicing (described in the Installation and Maintenance Manual) carried out by your authorised TROPHY distributor.

Between servicings, you are advised to carry out the following checks every three months:

## ① Generator

- > Check the certification label is legible.
- > Check there are no oil leaks.

## ② Mechanical support

- > Check the wall framework is securely fixed to the wall.
- > Check all the labels are legible.
- > Check the scissor arm is stable in all positions.

## ③ Control unit and electrical installation

- > Check the symbols are always clearly legible.
- > Check the control unit cable and the power supply cable are in good condition.
- > Check earths are correctly installed.
- > Check the radiography control key returns to its initial position after use.

## ④ Functioning

- > Make an exposure (bitewing and film type 5), check the audible signal can be heard and that the X-ray emission light is visible.
- > Make an exposure (Occlusal and film type 5) and release the control button before the exposure time has elapsed. Check the message "OP. ERROR" is displayed.

### ⑤ Timer self-test

- > Switch the machine off.
- > Press the RVG key while simultaneously switching the machine on.
- > As soon as the first light comes on, release the RVG key.

All the functions and indicator lights of the control unit will be tested one by one, except the X-ray emission light. The audible alarm and display unit are also tested. At the end of this test, the number of exposures carried out since the machine was put into operation is displayed.

- > A short beep indicates the test has ended.

---

### IMPORTANT:

If the result of one of these checks is not satisfactory, we recommend you contact an authorised TROPHY technician for assistance. In the meantime, do not use the equipment.

---

### ⑥ Cleaning

- > Clean all accessible parts of the machine with an alcohol-based **non-corrosive** product, and avoid introducing liquids inside the machine.

### ⑦ Disinfecting

- > The usual disinfectant products can be used, but we recommend you protect the machine from contamination using barriers available from dental distributors.

**ERROR MESSAGES**

COOLING	Cooling cycle
OP. ERROR	Premature release of the radiography control. The display indicates the remaining exposure time.
kV ERROR	The generator's high voltage value is more than 10% below the required value.
POWER ERROR	No mains voltage or filament voltage.

**CANCELLING THE DIFFERENT ERROR MESSAGES**

- ☐ To cancel the message "**OP. ERROR**" (manipulation alarm) and the corresponding audible signal, press any key on the arch.  
Manipulation alarm: premature release of the radiography control.
- ☐ To cancel the messages "**kV ERROR**" and "**POWER ERROR**" you must switch off the machine.
- ☐ The message "**COOLING**" will stop when the generator has returned to a satisfactory temperature. Do not switch off the machine.

## TROUBLE-SHOOTING HINTS

PROBLEM	CAUSE	SOLUTION
Nothing lights up	Machine disconnected	Connect the machine
	Fuse F3 or F4 defective	Change the fuse(s)
	Main circuit-breaker OFF	Put it ON
Nothing lights up on the control unit	Control unit disconnected	Connect the control unit
	Fuse F1 or F2 defective	Change the fuse(s)
	Defective control unit	Replace the control unit
No X-ray emission	The generator is cooling	Wait for the "COOLING" message to disappear
	Radiography control key defective	Replace the control unit
Emission OK but exposure is too light, or even white	Wrong film type	See film type table page 18
	Generator wrongly positioned	Adjust position
	Exposure time too short	Modify the time selection
	Development time too short	Refer to development instructions
	Developer too cold	Heat it
	Developer too old	Change it
	RVG key incorrectly selected	Adjust according to equipment used
	Film wrong way round	Refer to the film positioning section
	Incorrect installation	Call a qualified technician
Emission OK, but exposure is too dark	Wrong film type	See film type table page 18
	RVG key incorrectly selected	Adjust according to equipment used
	Development time too long	
OP. ERROR	The radiography control was released before the end of exposure	Select a tooth to stop the alarm. The display shows the remaining exposure time. Decide whether to develop or to make another exposure.
kV ERROR POWER ERROR	The microprocessor has detected a problem	Stop the machine and then restart it. If the problem continues, call a qualified technician.
	Fuse F1, F2, F3 or F4 blown out	Stop the machine, change the defective fuse(s), and restart. If the problem continues, call a qualified technician.





4, rue F. Pelloutier - Croissy-Beaubourg  
77437 MARNE-LA-VALLÉE Cédex 2 FRANCE  
Ph. : + 33 1 64 80 85 00 - Fax : + 33 1 64 80 85 85  
Site Internet : <http://www.trophy-imaging.com>  
E-mail : [customer-service@trophy-imaging.com](mailto:customer-service@trophy-imaging.com)

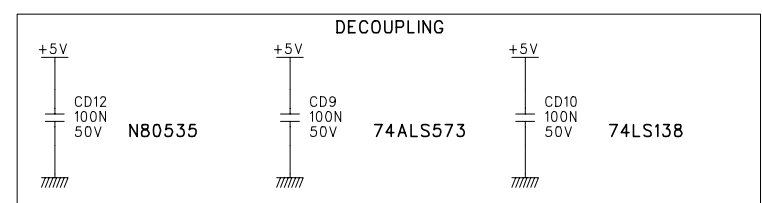
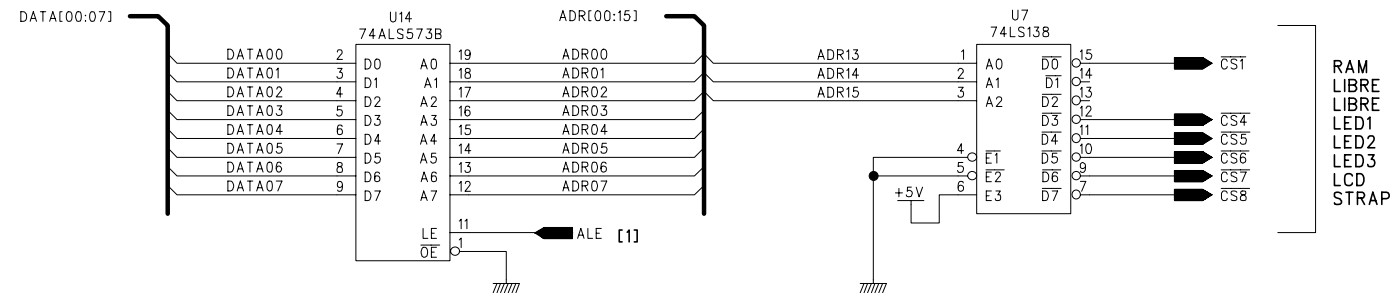
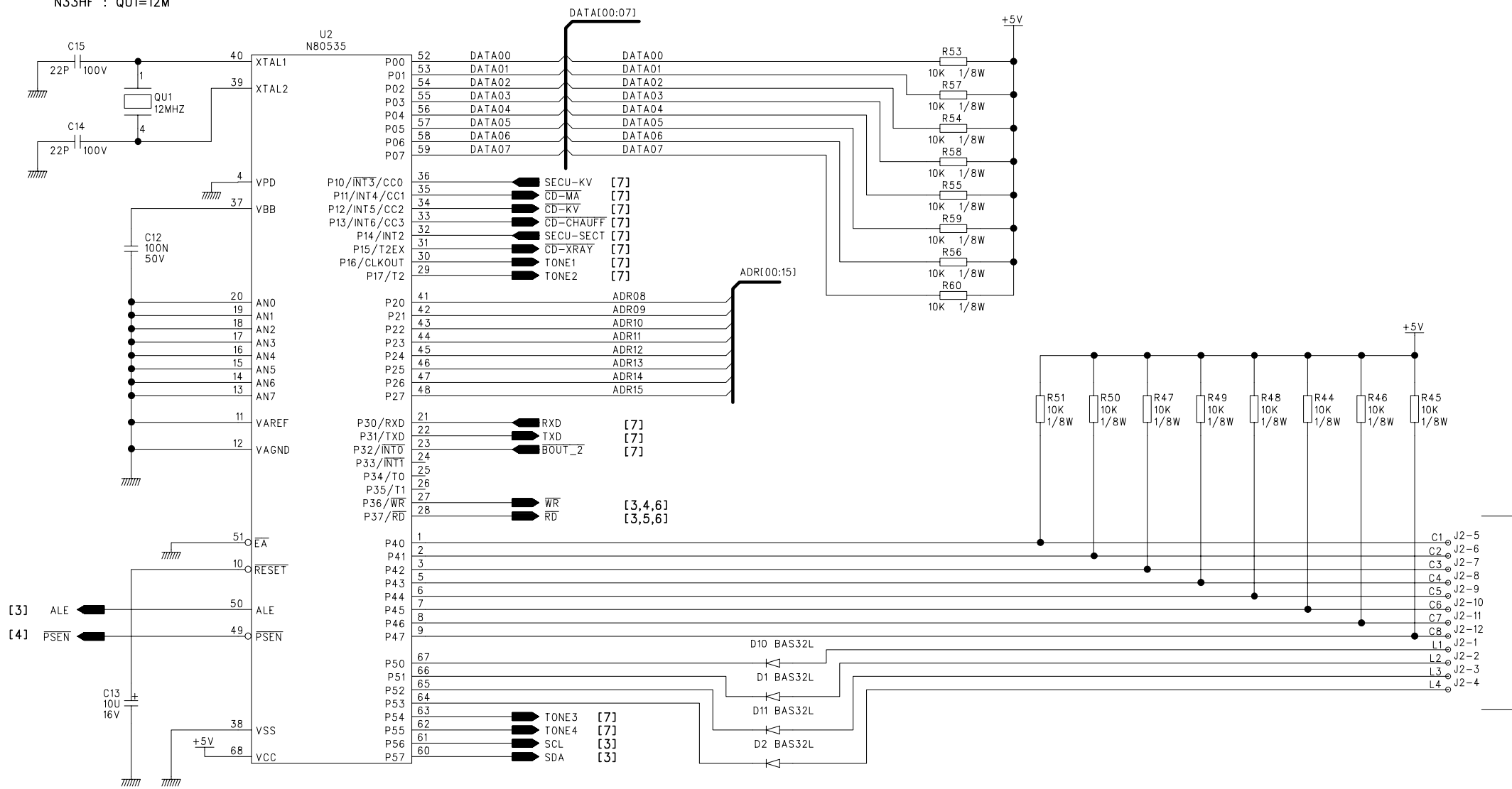
TROPHY BÉNÉLUX	30, avenue des Nymphes - Centre Cial Les Dauphins B 1410 - WATERLOO Ph. : + 32 2 354 15 28 / 68 74 - Fax : + 32 2 353 04 60
TROPHY ESPAÑA S.L.	Calle Pilar de Zaragoza, 15 28028 MADRID Ph. : + 34 91 355 88 09 - Fax : + 34 91 356 89 82
TROPHY GERMANY GmbH	Gerbereistr. 7 D 77694 KEHL-KORK RHEIN - GERMANY Ph. : + 49 78 51 93 970 - Fax : + 49 78 51 939 730
TROPHY ITALIA spa	Via Guarenti, 4 20035 - LISSONE (MI) Ph. : + 39 0 39 27 80 864 / 877 - Fax : + 39 0 39 27 80 889
TROPHY RADIOLOGY (UK) Ltd	Unit 3, Block B, Connaught, Business Centre 9, Malham Rd, Forrest Hill LONDON, S.E. 23 1AH/UK Ph. : + 44 1 81 291 99 09 - Fax : + 44 1 81 291 98 00
TREX TROPHY DENTAL DIVISION	37 Apple Ridge Road DANBURY, CT 06810 USA Ph. : + 1 203 207 - 45 45 - Fax : + 1 203 207 - 45 46
TROPHY JAPAN	TOKYO-TO MINATO-KU Toranomom 1-23-7 Toranomom 23 Mori Building JAPAN Ph. : + 81 3 35 80 68 81 - Fax : + 81 3 35 80 68 83

CJ 428  
REMOTE CONTROL BOARD  
ELITYS AND N33HF

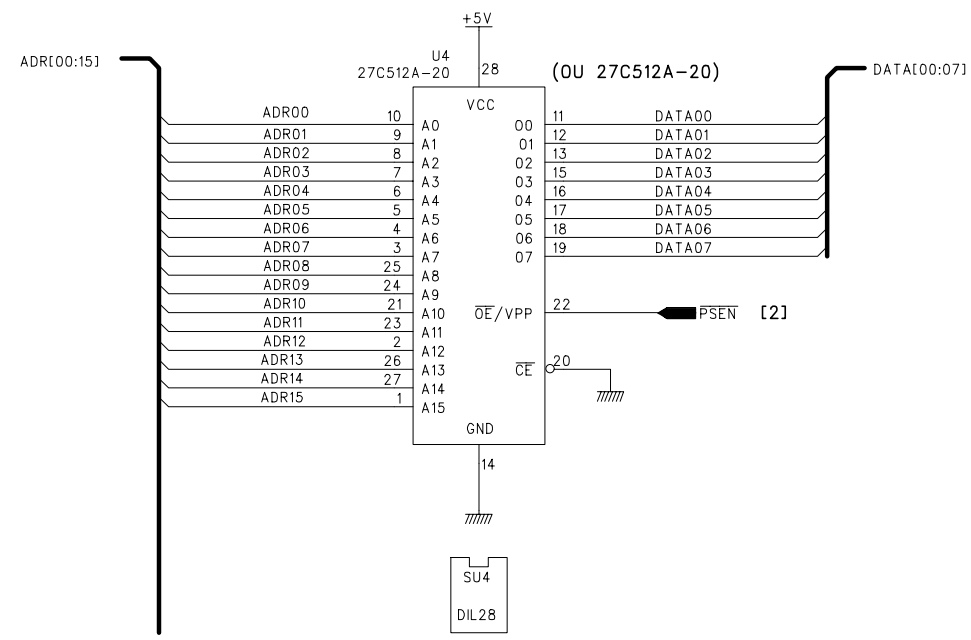
5C	3731	MODIFICATIONS			23/06/99			
5B	3075	MAJ FILAIRE SUITE CHGT 80C535			08/12/97			
5A	2764	MAINTENANCE PRINTED CIRCUIT BOARD			05/11/96			
IND	in AVIS	MODIFICATIONS			DATE	APPR.by		
MADE:NESME		DRAW:PARELEC		APPR:	TROPHY RADIOLOGIE			
DATE:24/10/96		DATE:05/11/96		DATE:				
FUNCTION:REMOTE CONTROL				DRAWING Nr	CODE	R	REV	SHEET
				900428	SC 428	5	C	1/7



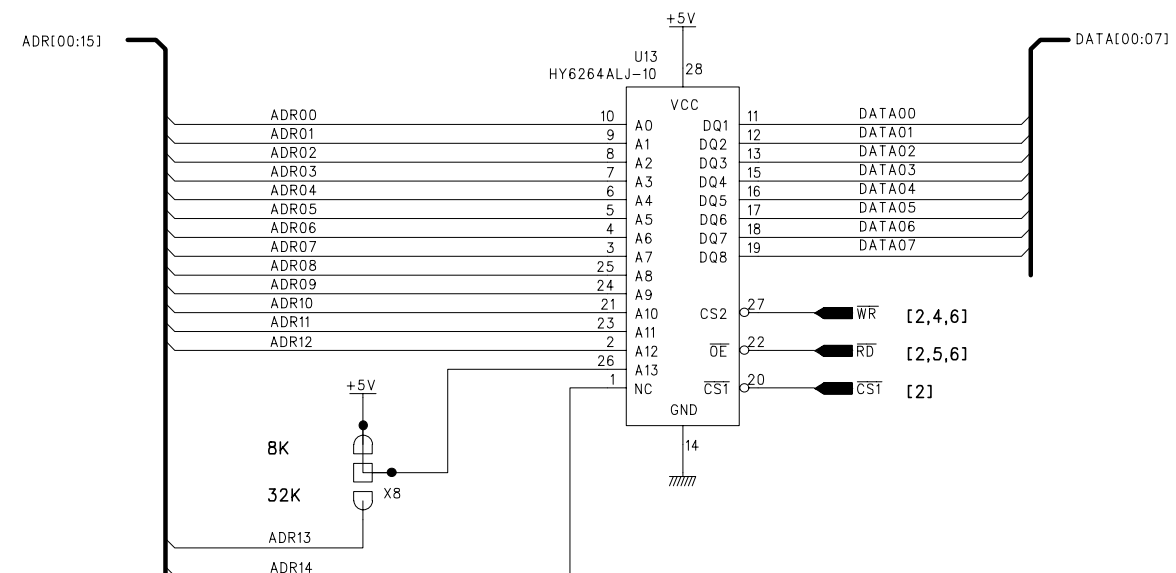
ELITYS : QU1=11,0592M  
N33HF : QU1=12M



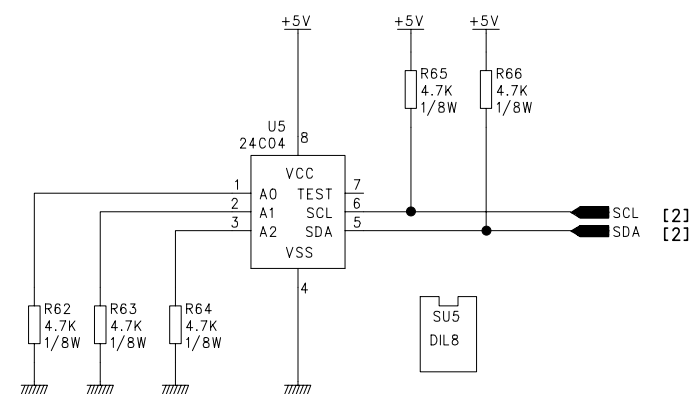
FUNCTION: MICRO	TROPHY RADIOLOGIE					
	DRAWING Nr	CODE	R	REV	SHEET	
	900 428	SC 428	5	C	2/7	



EPROM 64 X8K

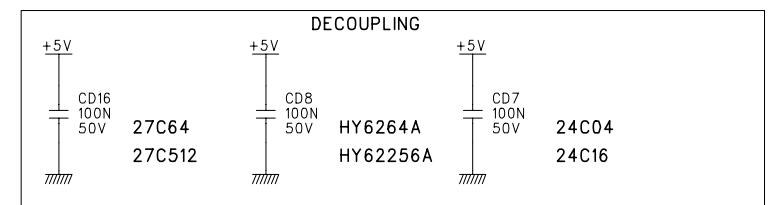


SRAM 8K X8  
SRAM 32K X8

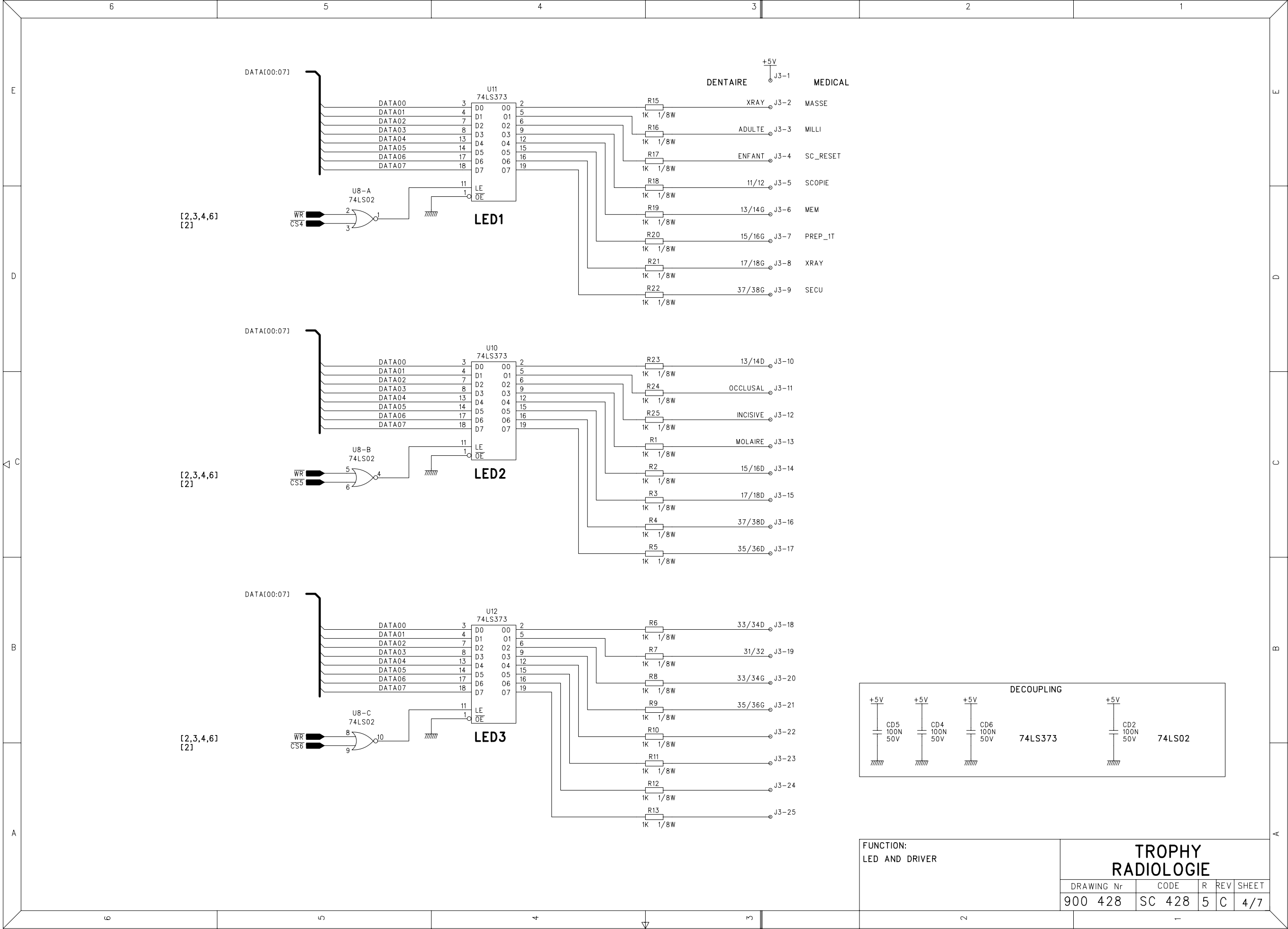


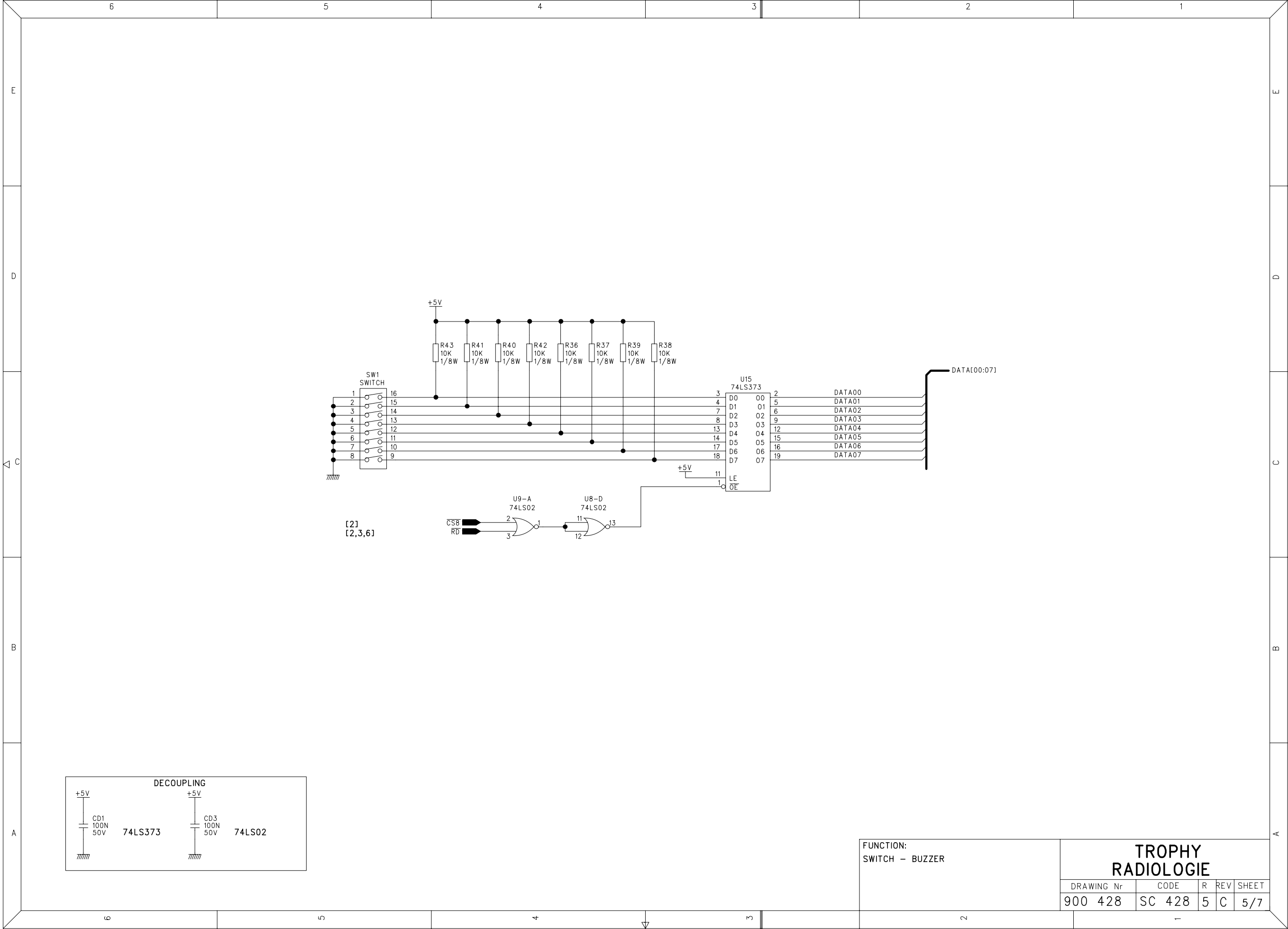
E2PROM SERIAL BUS I2C 512 X8  
E2PROM SERIAL BUS I2C 2K X8

N33HF	ELITYS
E2PROM 2K X8 : 24C16	E2PROM 512 X8 : 24C04
THE SRAMS ARE INITIALLY ALLOWED IN 8K x8 THEY COULD BE NEVERTHELESS FURTHERMORE REPLACED BY 32K x8	



FUNCTION: MEMORY	TROPHY RADIOLOGIE				
	DRAWING Nr	CODE	R	REV	SHEET
	900 428	SC 428	5	C	3/7





DECOUPLING

+5V

CD1  
100N  
50V

74LS373

+5V

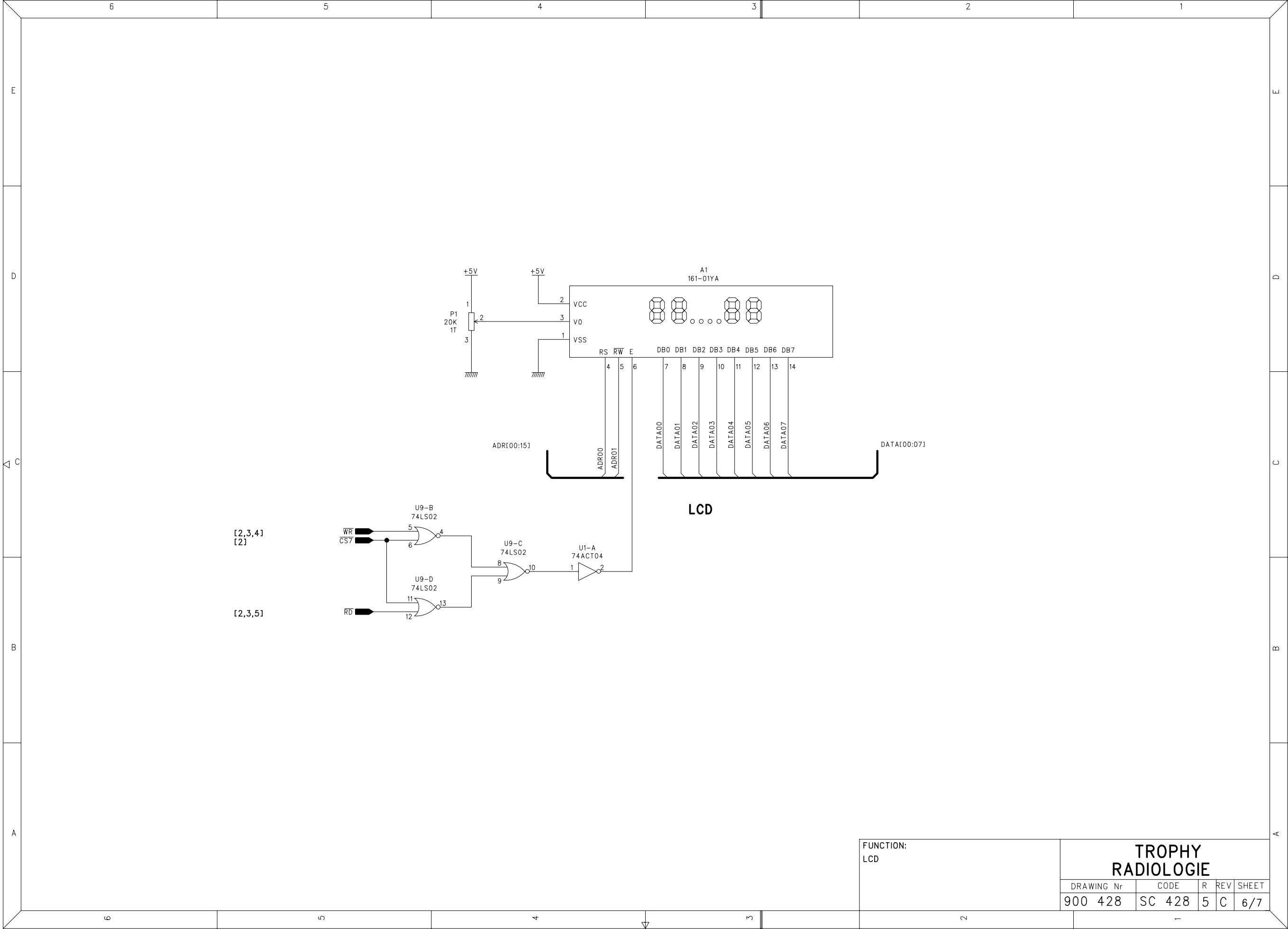
CD3  
100N  
50V

74LS02

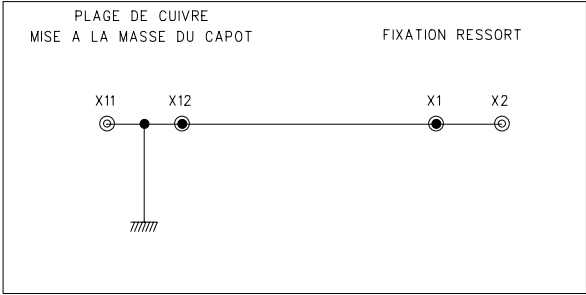
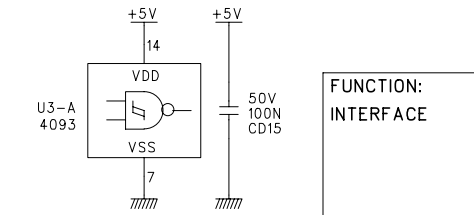
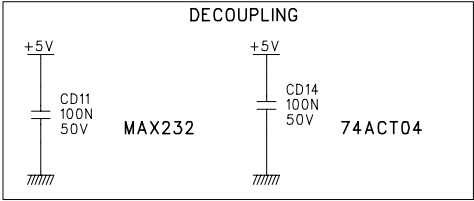
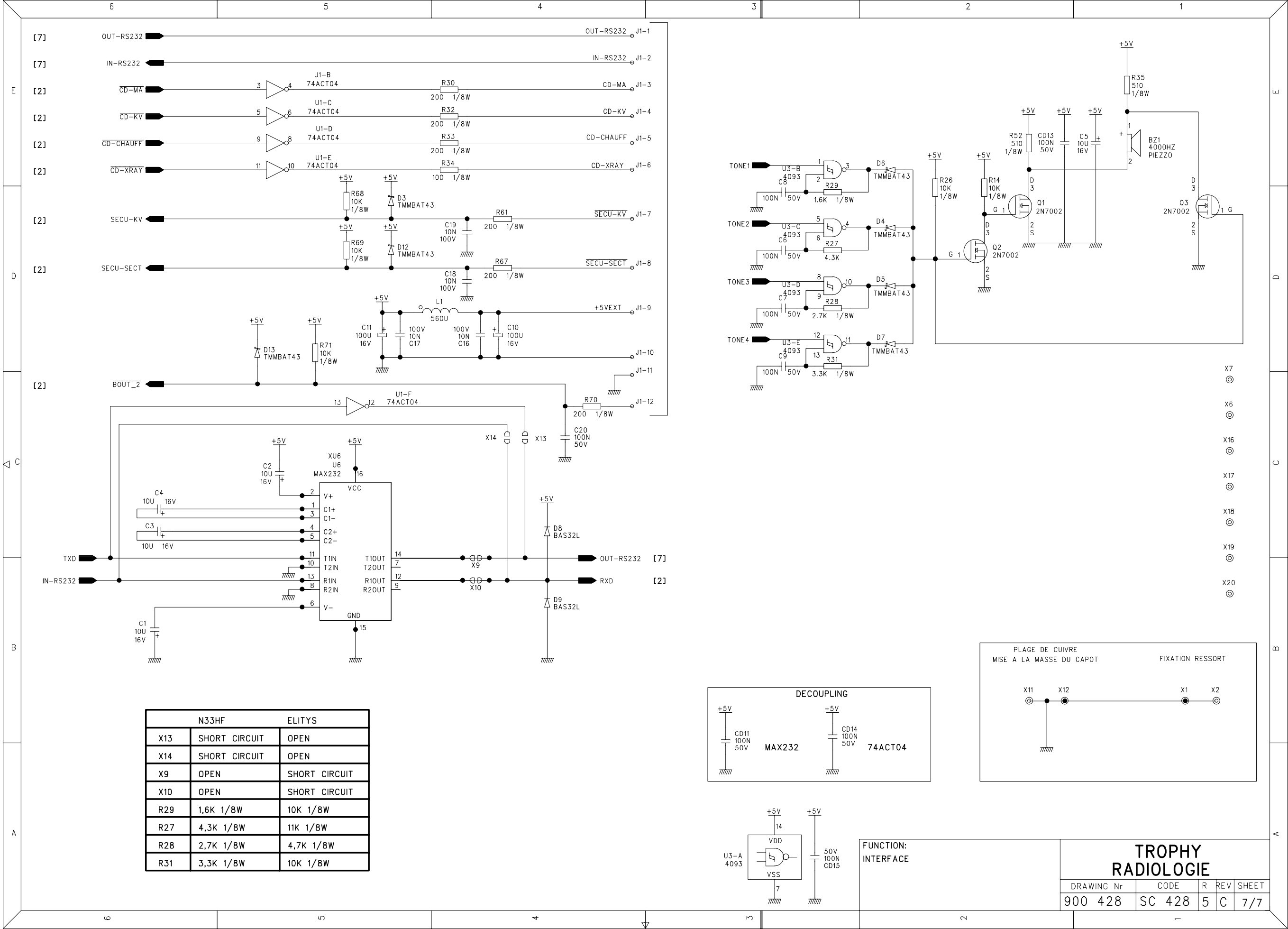
FUNCTION:  
SWITCH - BUZZER

TROPHY  
RADIOLOGIE


DRAWING Nr	CODE	R	REV	SHEET
900 428	SC 428	5	C	5/7

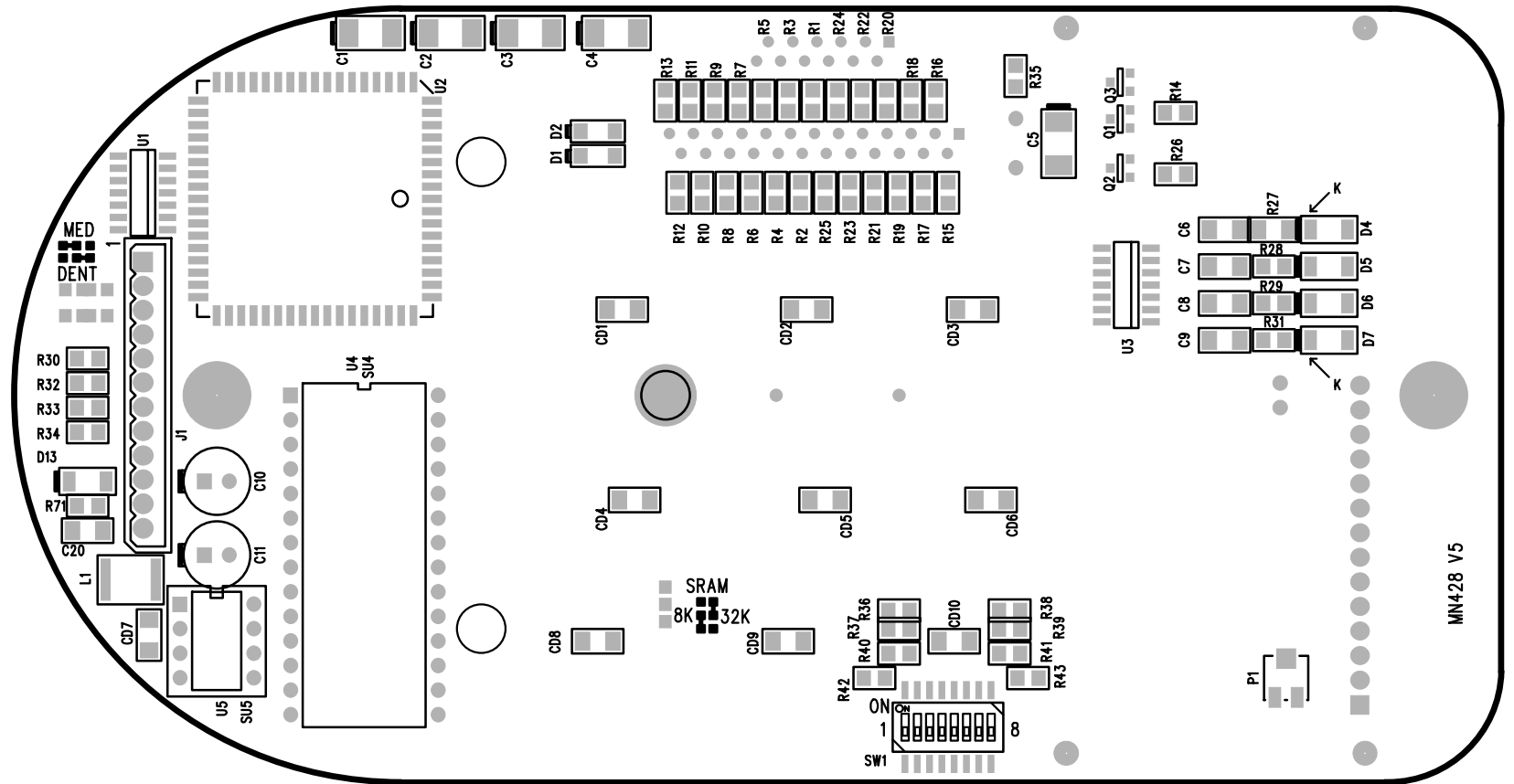


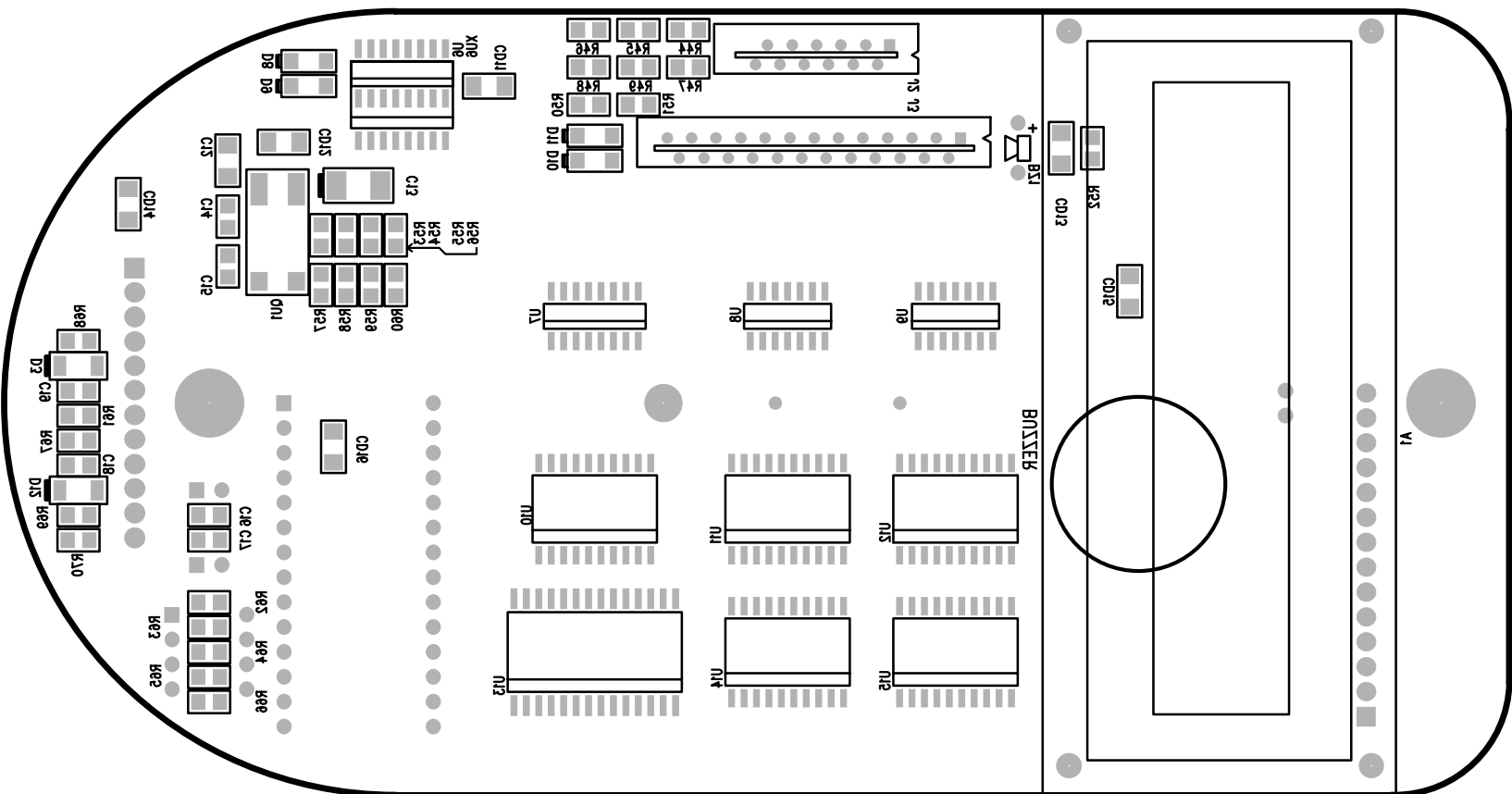
FUNCTION: LCD	TROPHY RADIOLOGIE				
	DRAWING Nr	CODE	R	REV	SHEET
	900 428	SC 428	5	C	6/7



TROPHY RADIOLOGIE				
DRAWING Nr	CODE	R	REV	SHEET
900 428	SC 428	5	C	7/7

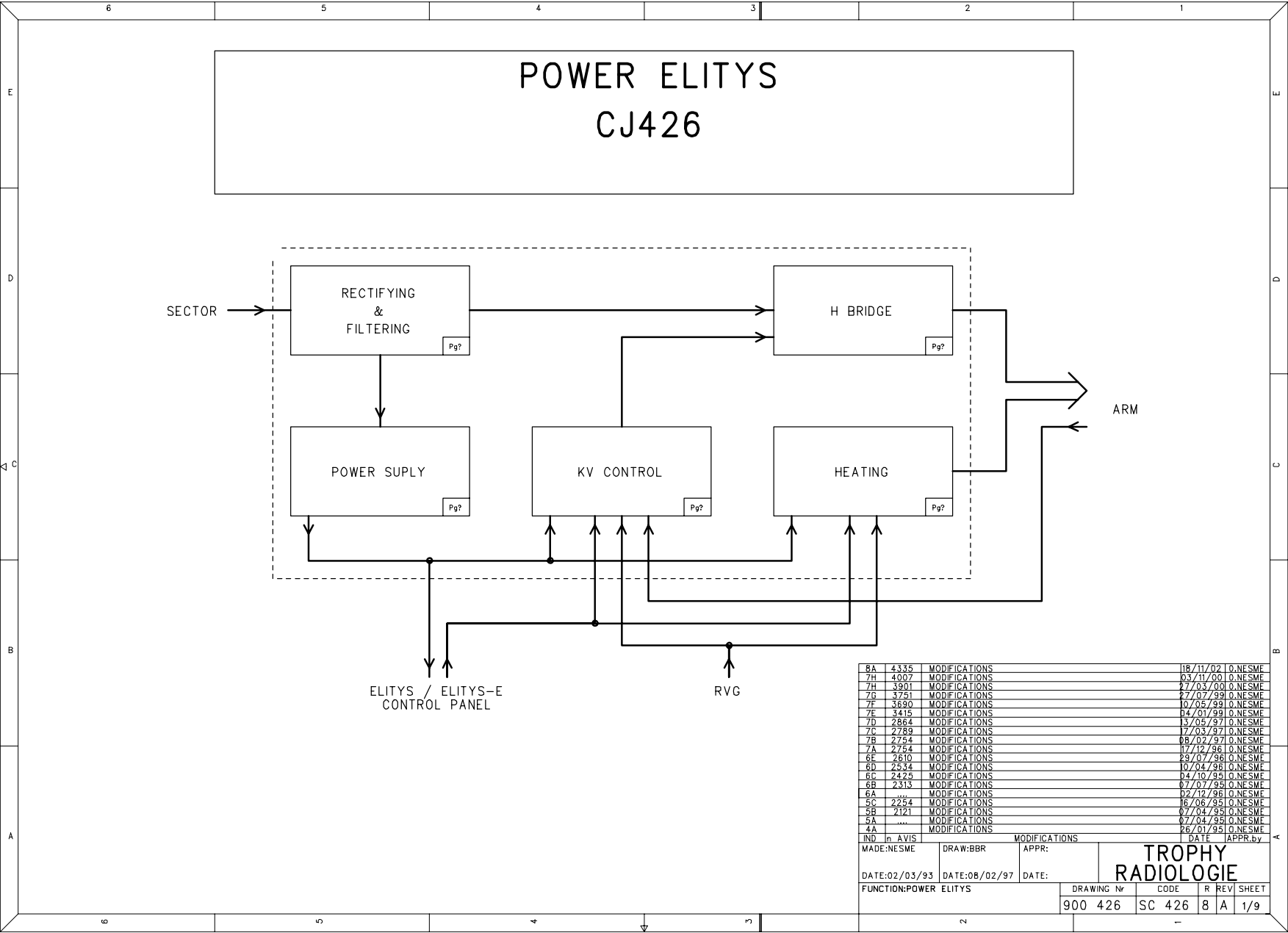

 X TROPHY MN 428 V5 / 924 428-5 / SERIGRAPHIE FACE COMPOSANTS



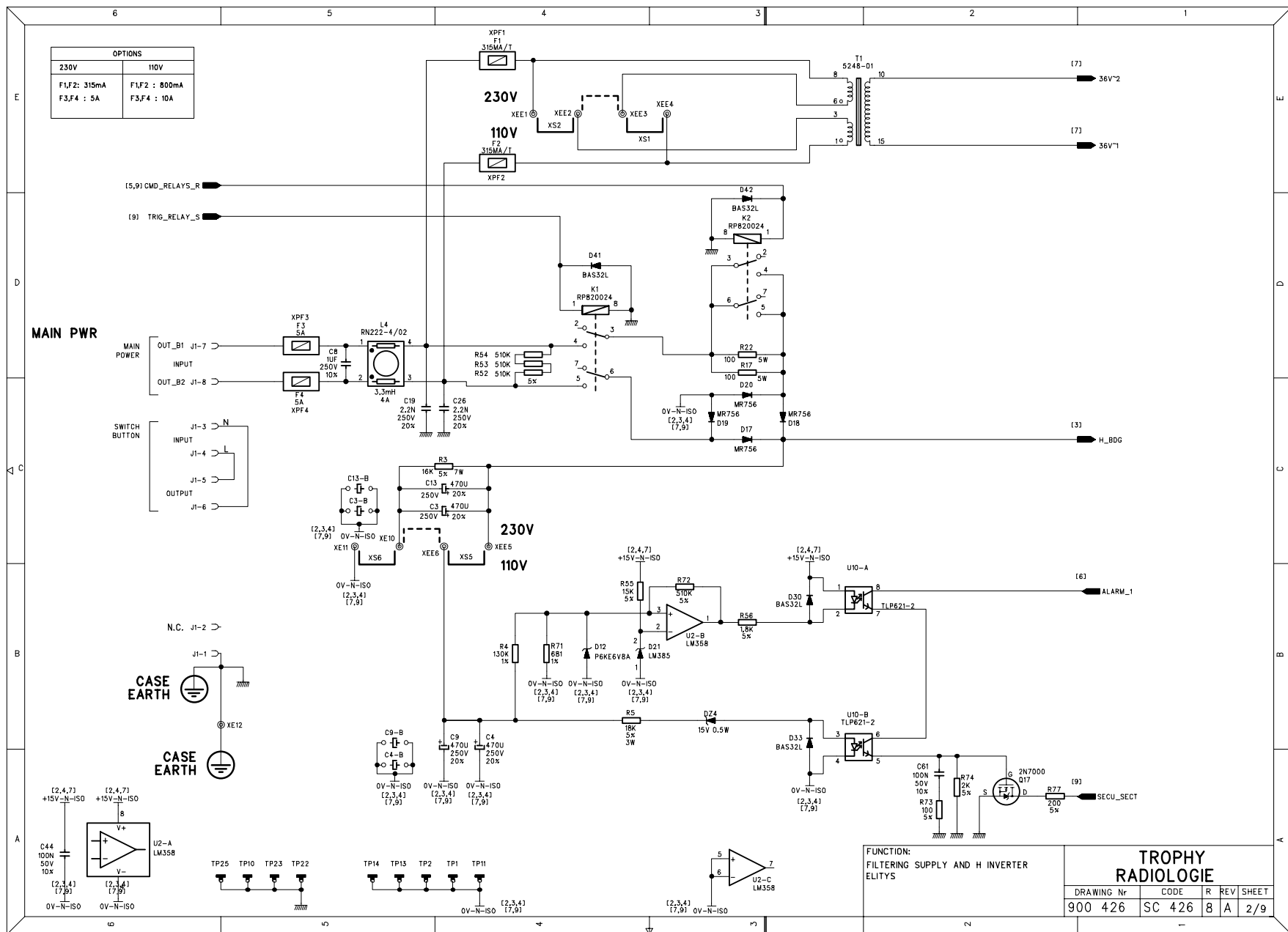


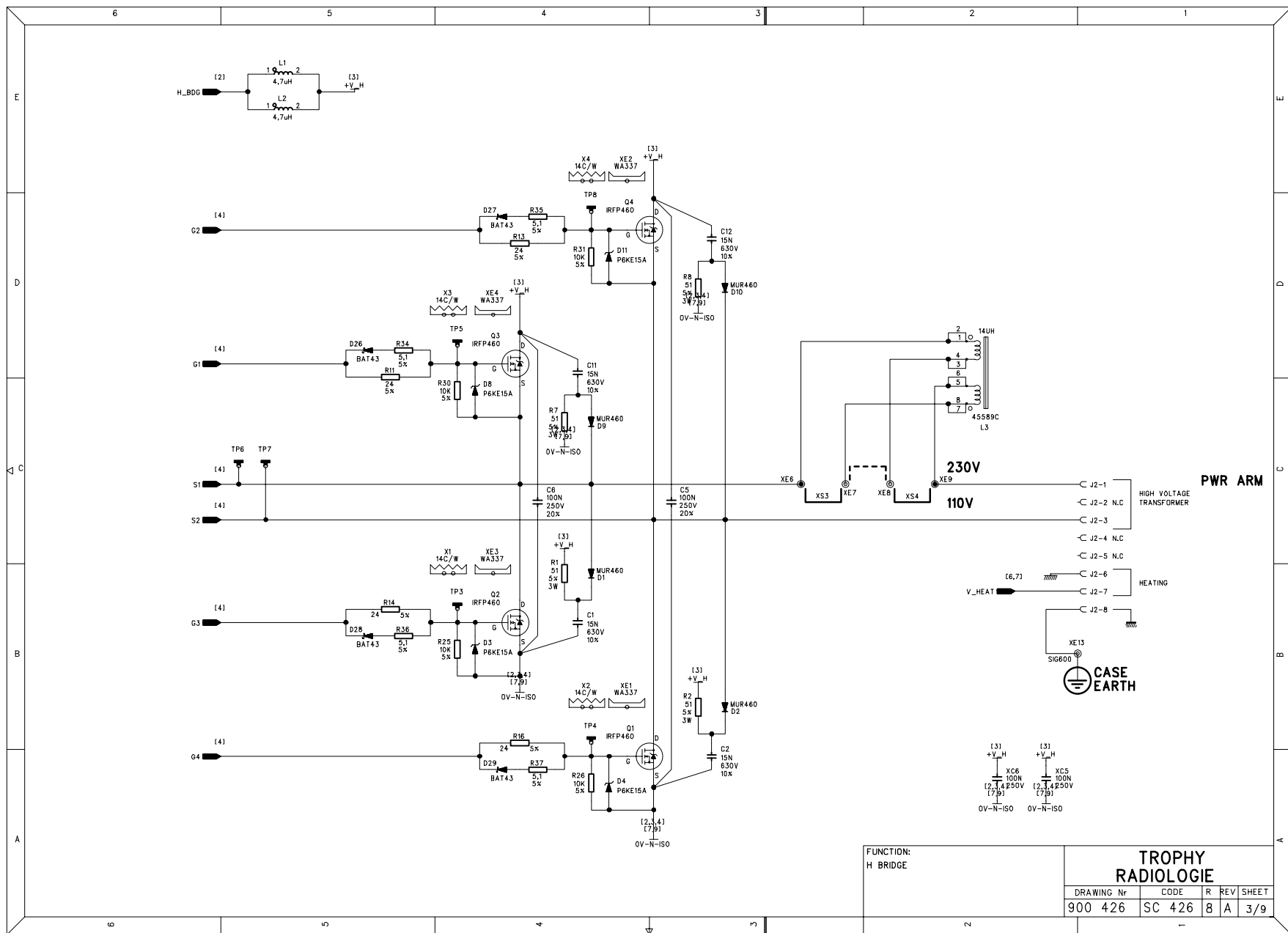
Y  
X TROPHY MN 428 V5 / 925 428-5 / SERIGRAPHIE FACE SOUDURES

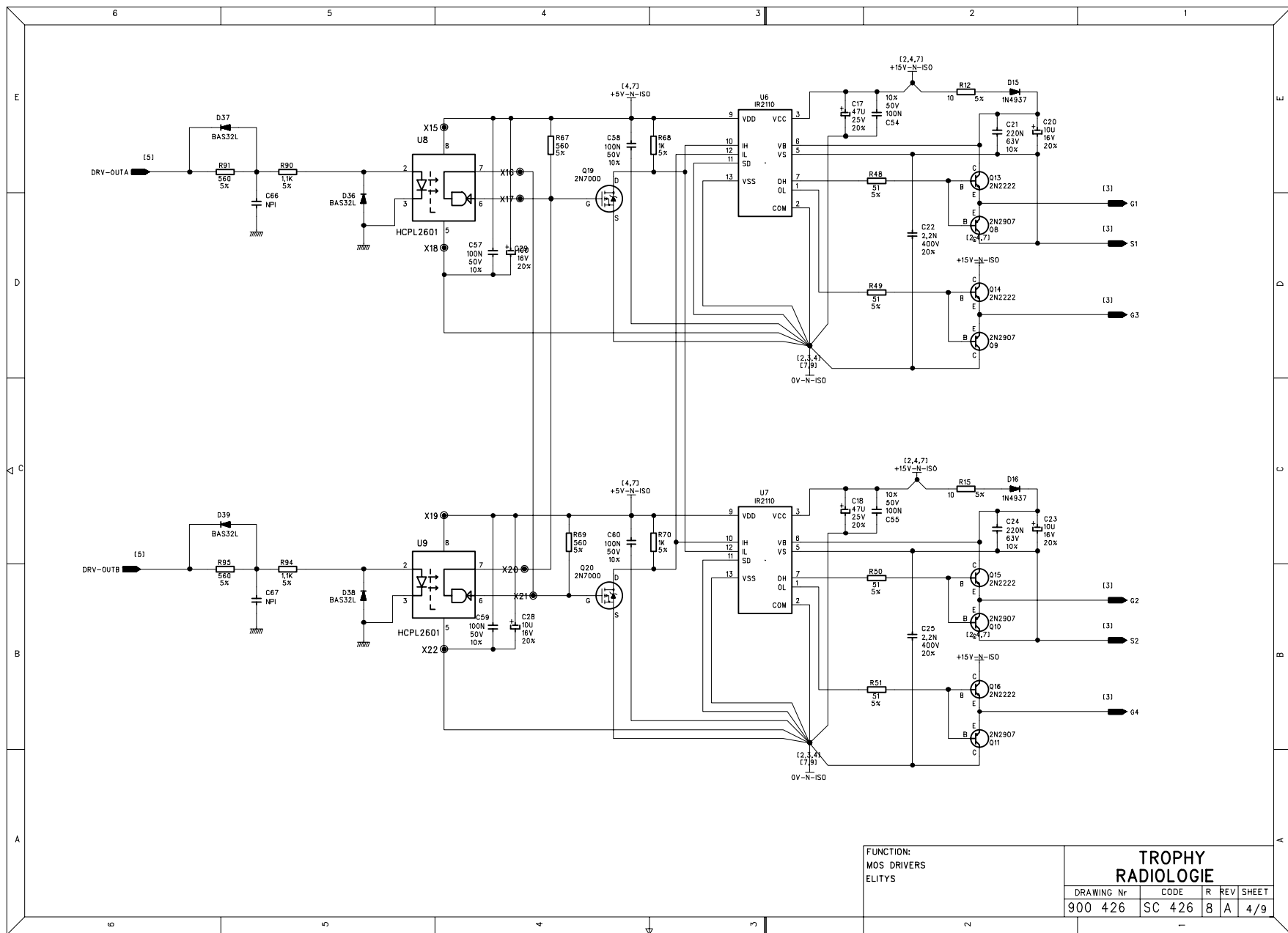


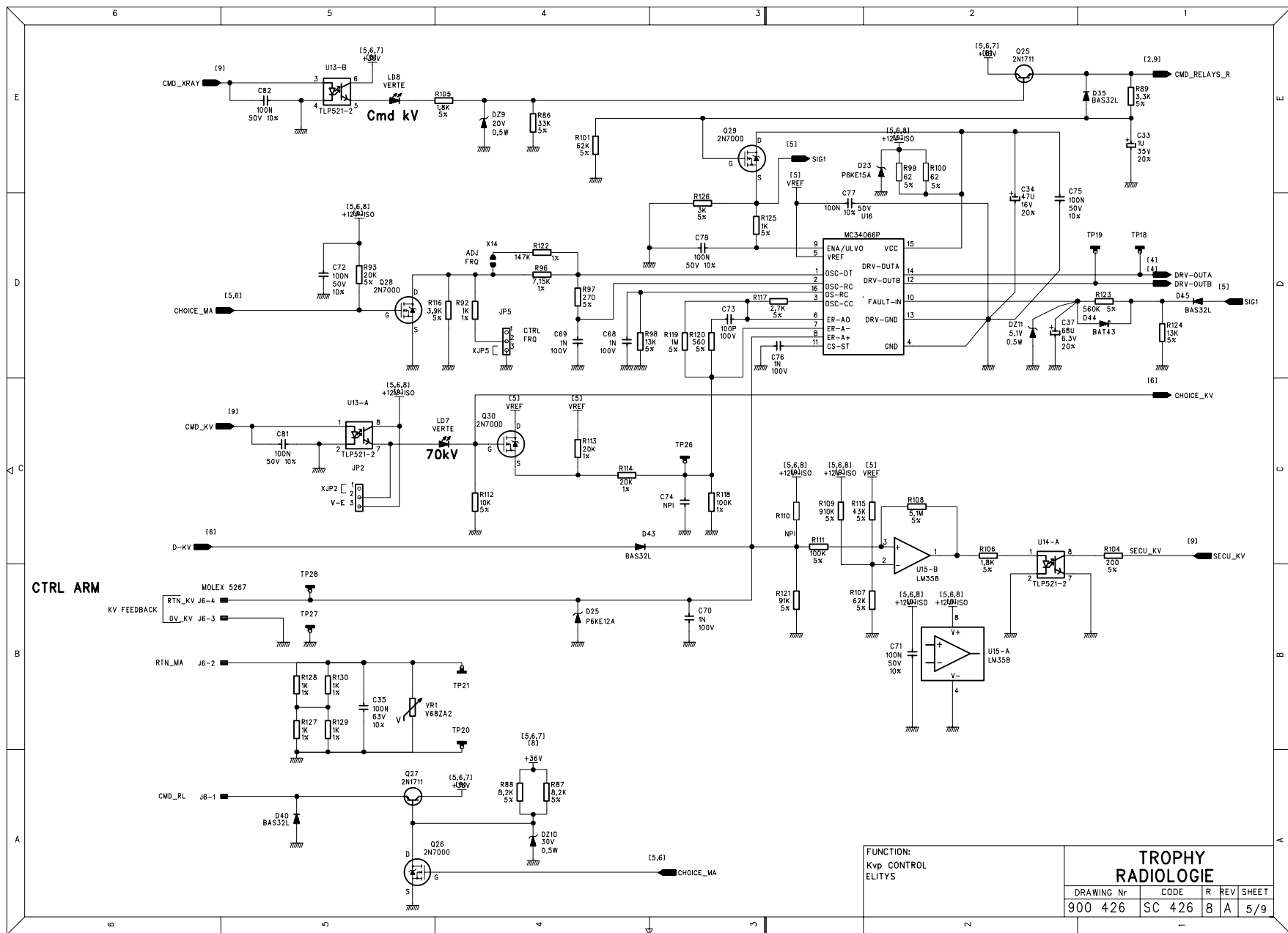


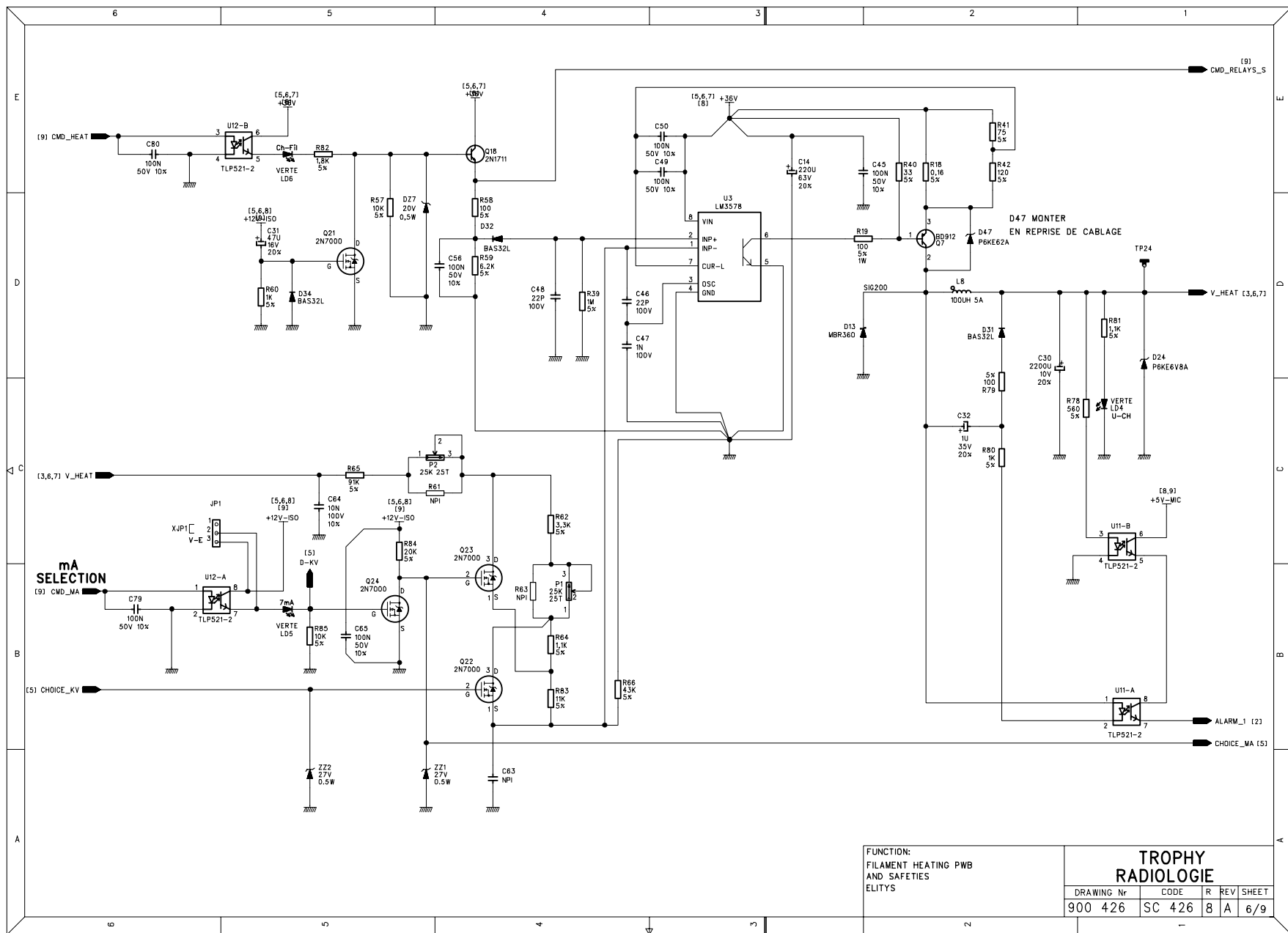
E  
D  
C  
B  
A

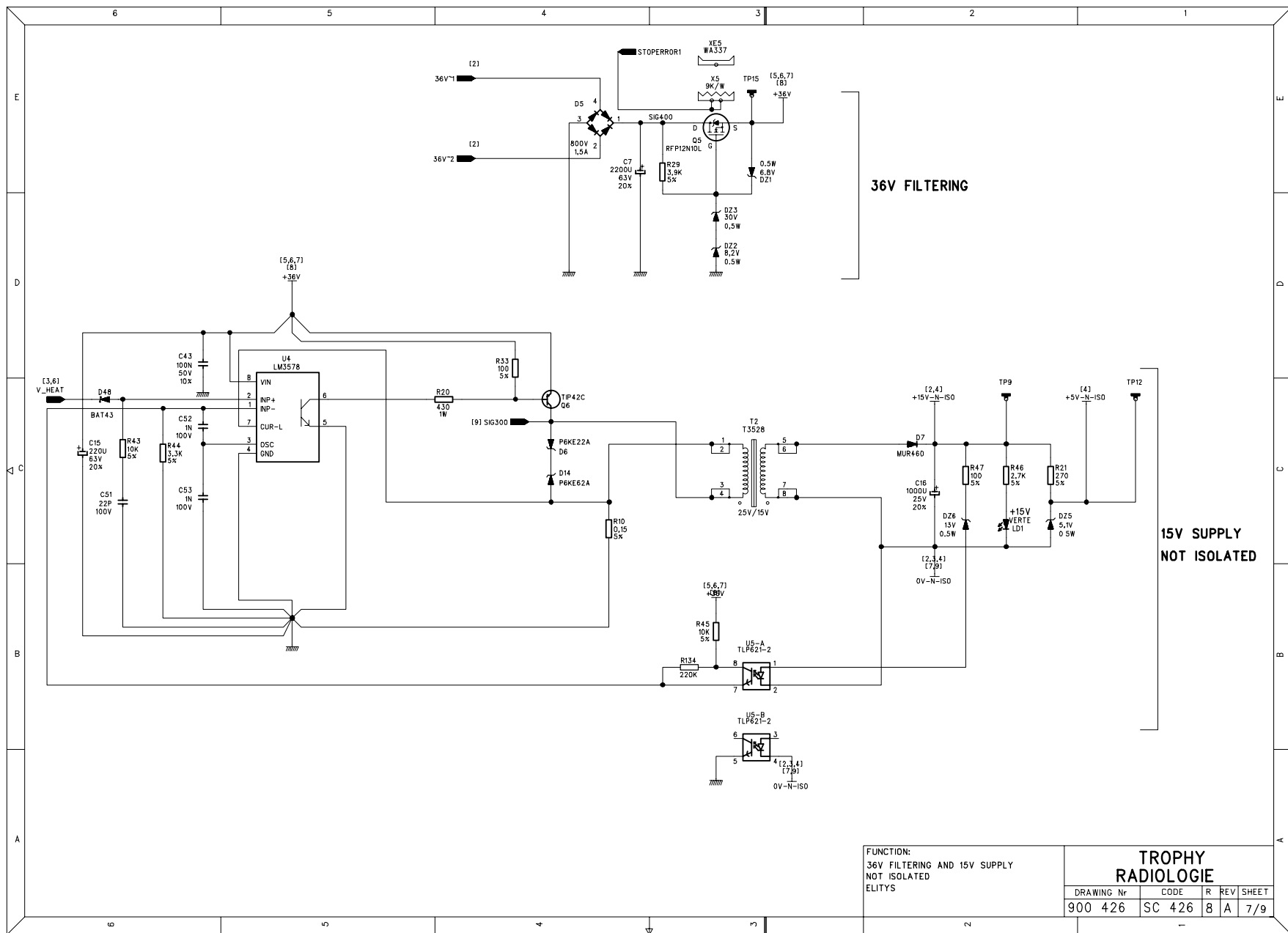


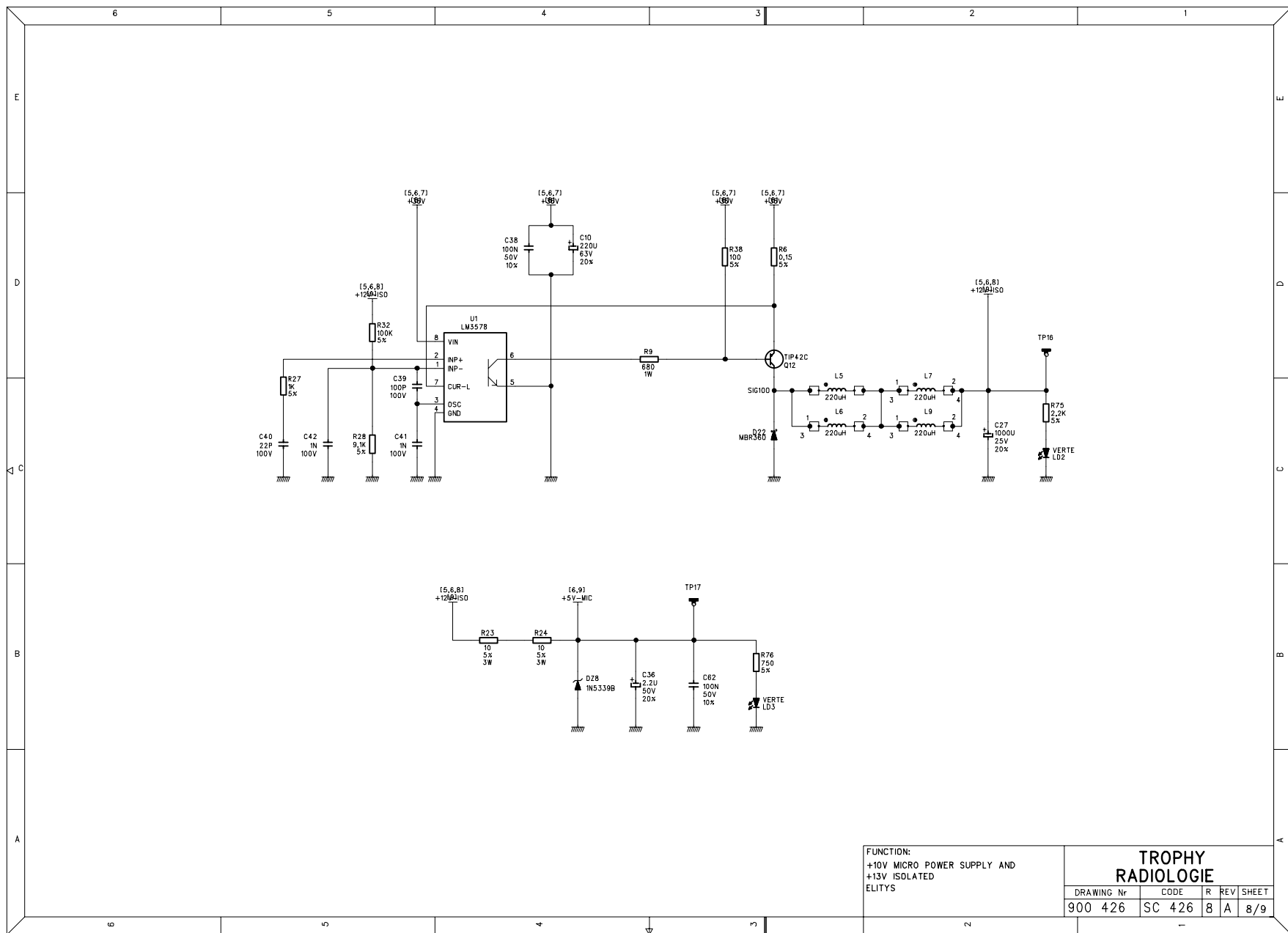




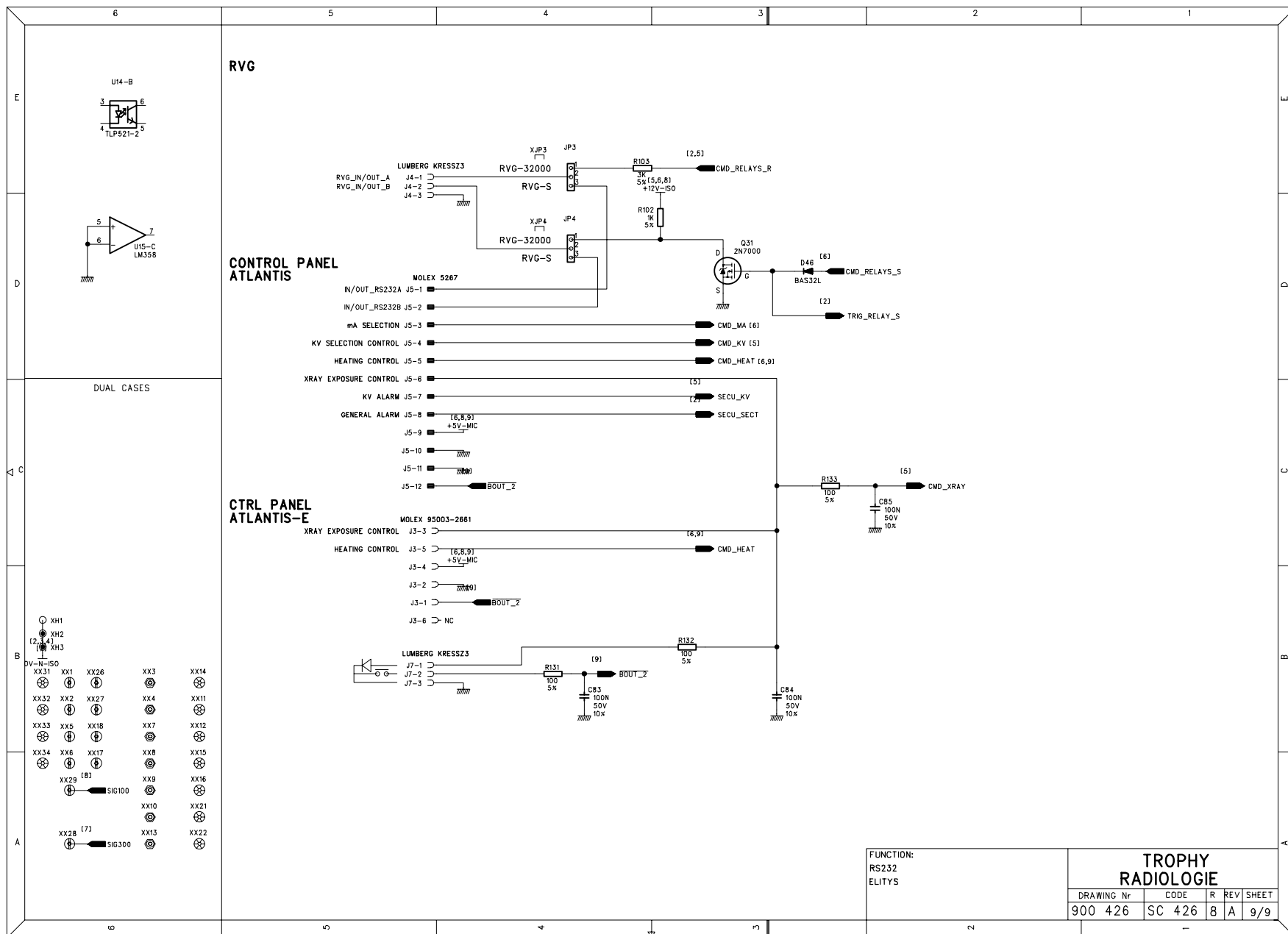


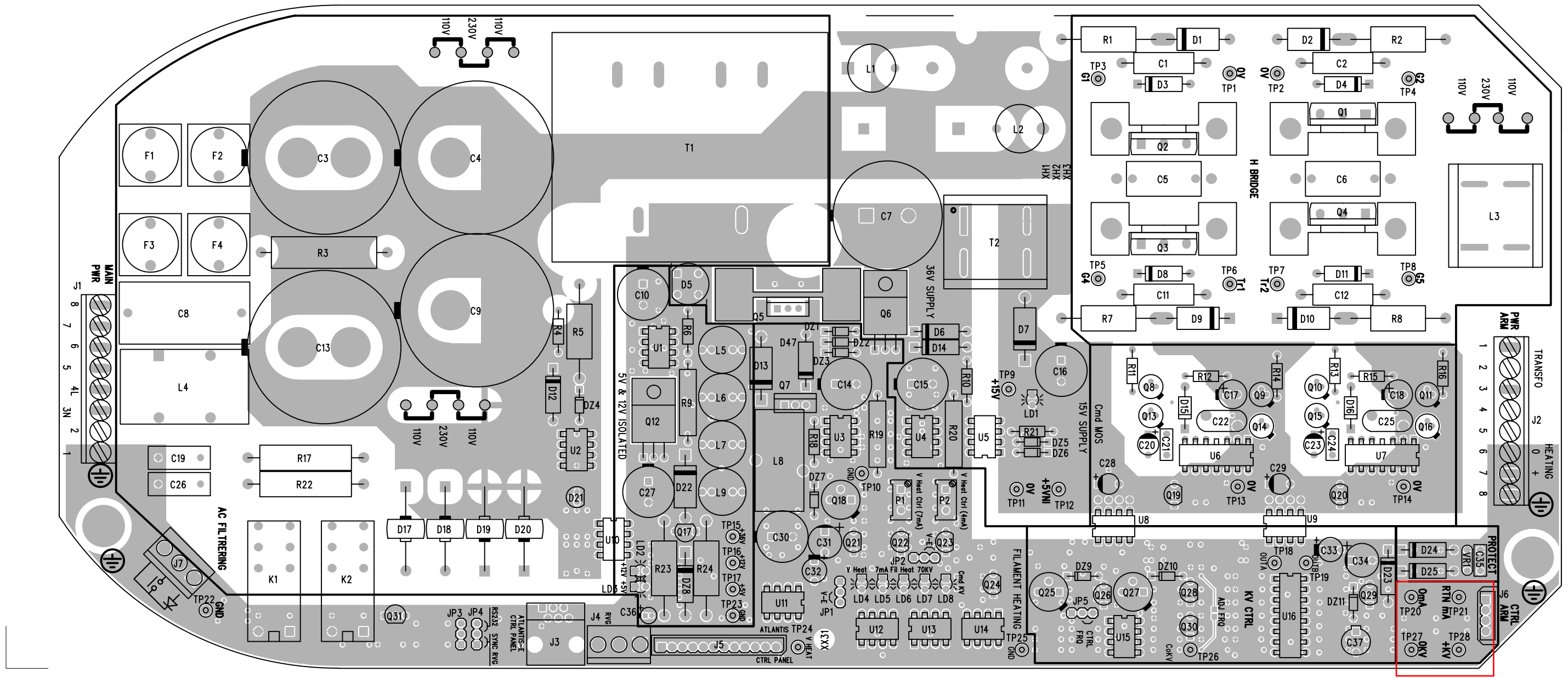


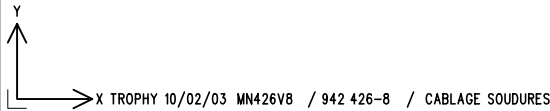












# Technical Training

## - Test and Reset List -



# Meaning of alarm list

## Available for Eprom version 9.04

- « Cooling » cooling cycle, wait until the message disappears
- « kV Error »: this message means that the kV value is less than 50 kV during more than 10 ms
- « Power Error » Vh>

230 V	115 V
> 320 VAC	> 160 VAC
< 47 VAC	< 23 VAC

Ufilament<minimum voltage (ex. 2V)

Ifilament=0A or Filament Circuit HS

# Initialisation or autotest procedure

- **To test the eeprom:**

Press the film type minus (f-). The message « Eeprom test » will be displayed, during 30 seconds and after « Eeprom passed » will be displayed if the eeprom is OK.

- **Auto test:**

Press RVG button and simultaneously switch the timer ON. You will see first the eeprom version (Trophy V. 9.4), then it will test the leds, the key test by pushing any key, the position of the switches (SW1-8...) and, finally, it will display the total number of exposures.

- **Timer Reset:**

Press the keys kV and RVG and simultaneously turn the timer ON.

The message « Elitys Init » will be displayed, this initialisation will reset the Thermal and The exposure counter counter.

## **NOTICE:**

To do this reset, you have to check the temperature of the tube head or ask the doctor to wait minimum half an hour unusing the timer.

# - Electronic Test Procedure -



# TROUBLE SHOOTING

## 1/ Trouble-shoot procedures

Problem	Cause	Solution
<b>Nothing lights up ON/OFF green switch stays OFF</b>	Machine disconnected	Connect the machine (plug power supply)
	Main circuit-breaker OFF	Put in ON
	ON/OFF green switch is defective or Power connection problem	Check the 220V over the ON/OFF switch or remove the switch and connect the line directly to terminals 7 and 8
<b>Nothing lights up on the Hand-held timer but ON/OFF green switch stays ON</b>	Fuse problem	Check F4, F3, F2 and F1
	LD3 is OFF on power board CJ426	Replace Power Board
	5V is not present on hand-held timer	Replace hand held timer (including cable between timer and Power Board). In case of 11 pin timer connector, leave the pin on the TP2 side free.
<b>No X-ray emission (unexposed picture) X-ray indicator remains OFF when X-ray button is pressed</b>	The generator is cooling	Wait until the « Cooling » message disappears (please refer to User Manual)
	X-ray button doesn't work	Follow the auto test procedure – § 2 – to check hand-held X-ray button. If it is defective, replace the hand-held timer
	X-ray button is working	Replace the hand-held timer
	Remote X-ray button doesn't work	Refer to the Installation Manual to set the dipswitches of the hand-held timer correctly.



Problem	Cause	Solution
<b>No X-ray emission X-ray indicator is ON when X-ray button is pressed</b>	No error message over the display	Replace the hand-held timer
	Error message appears « kV error » or « Power error » LD8 of Power Board is OFF	On the Power board, check between pins 3 and 4 of IC 13 if the opto is turned on (should rise to ~ 1.2 Vdc) If not, replace the hand held timer. If yes, replace the Power Board
	LD8 of Power Board is ON	Follow « kV Error » or « Power Error » test procedure – § 3.

<b>X-ray emission OK but picture is too light over the film</b>	The generator is wrongly positioned	Adjust position
	The exposure time is too short	Modify the time selection
	The developer is too old	Change the chemicals
	Development time too short	Refer to development instructions. Check the temperatures of the chemicals
	Developer too cold	
	Film is in the wrong way(backwards)	Refer to the film positioning section
	RVG key selected, RVG led ON	Press RVG button to switch OFF the led
	Wrong film type	See film type table on page 18 of the User's Manual
	Tube head problem	Follow « kV Error » or « Power Error » test procedure – § 3.

Problem	Cause	Solution
<b>Picture is too dark over the film</b>	Wrong film type	See film type table on page 18 of the User's Manual
	Exposure time too long	Modify the time selection
	X-ray film pre-exposed	Change film box
	Development problem	Refer to development instructions (development time, temperature)

<b>OP. Error</b>	The exposure switch was released before the end of the exposure (X-ray button must be pressed beyond the exposure time)	Select a tooth to stop the alarm. The display shows the remaining exposure time. Decide whether to develop or to make another exposure.
		If the problem remains, replace the hand-held timer.

<b>kV Error Power Error</b>	Tube head, power board or power arm cable problem	Stop the machine and then restart it
		If the problem remains, follow « kV Error » or « Power Error » test procedure – § 3.

Problem	Cause	Solution
<b>All the leds and beeper are ON on the hand-held timer</b>	Eeprom is out of the socket	Open hand-held timer and reinstall Eeprom
<b>LCD of hand-held timer is OFF but everything remains normal</b>	LCD brightness adjustment Open hand-held timer and adjust brightness with P1 (solder side of keyboard)	

## 2/ Auto test procedure

**This procedure should be used to check the hand-held timer.**

Select « Auto-test by pressing « RVG » button and simultaneously switch the timer ON. Elitys software version will be displayed first, then « led test » will start and after, « key test » will be displayed. Then, you can test hand-held timer buttons, if you don't press any button during 1 minute the timer will display the timer dipswitch configuration (SW 1–8: --- -----), and after the exposure counter.

Then the timer is setted automatically to user mode.

### 3/ « kV Error » and « Power Error » Test Procedure

**Power Board and Tube Head should be replaced together. If you are sure (according test procedure), then you can replace the defective part only.**

a) Switch on the generator, connect DC voltmeter between:

CJ 426 Power Board			
Test point	And test point	Values required	If wrong measures
GND	+ 36 V	$30\text{ V} < \dots < 41\text{ V}$	Replace the board
GND	+ 12 V (LD 2)	$11.4\text{ V} < \dots < 12.6\text{ V}$	Replace the board
GND	+ 5 V (LD 3)	$5.3\text{ V} < \dots < 5.9\text{ V}$	Replace the board
0 V	+ 15 V (LD 1)	$13.5\text{ V} < \dots < 15\text{ V}^*$	Replace the board
0 V	+ 5 VIN	$4.8\text{ V} < \dots < 5.4\text{ V}^*$	Replace the board

\* With CJ 426.V8: only during exposure

## b) Power circuit check:

Switch off the generator. With multimeter, make the following measurements on CJ 426 board (ohm meter)

Between test point	And test point	Values required	If wrong measures
0 kV	+ kV	$10.6 < \dots < 12.6 \text{ k}\Omega$	Go to chapter c, d and e
0 mA	RTN mA	1 k $\Omega$	Go to chapter c, d and e
0 mA	J2 – 8 (PWR ARM)	About 0 $\Omega$	Go to chapter c, d and e
0 mA	J2 – 7 (PWR ARM)	About 0 $\Omega$	Go to chapter c, d and e
0 mA	J2 – 6 (PWR ARM)	About 0 $\Omega$	Go to chapter c, d and e
0 mA	J2 - 3 (PWR ARM)	Open circuit	Go to chapter c, d and e
0 mA	J6 – 1 (CTRL ARM)	About 3 k $\Omega$	Go to chapter c, d and e
J2 – 1 (PWR ARM)	J2 – 3 (PWR ARM)	About 0 $\Omega$	Go to chapter c, d and e

### c) Checking the board:

Disconnect head-cable of CJ 426 board (J2 terminal and J6 CTRL ARM).  
Make the following measurements (ohm meter).

Test point	And test point	Values required	If wrong measures
0 kV	+ kV	$86.5 < \dots < 95.5 \text{ k}\Omega$	Replace the board
0 mA	RTN mA	1 k $\Omega$	Replace the board
0 mA	J2 – 8 (PWR ARM)	0 $\Omega$	Replace the board
0 mA	J2 – 6 (PWR ARM)	About 0 $\Omega$	Replace the board
0 mA	J2 – 3 (PWR ARM)	Open circuit	Replace the board
0 mA	J6 - 1 (PWR ARM)	Open circuit	Replace the board
0 V	G 1	10 k $\Omega$	Replace the board
0 V	G 2	10 k $\Omega$	Replace the board
Tr 1	G 4	10 k $\Omega$	Replace the board
Tr 2	G 5	10 k $\Omega$	Replace the board

#### d) Checking tube head:

Keep the head-cable disconnected (the tube must remain connected)

Make the following measurements on scissor arm cable.

Size / wire color	Size / wire color	Values required	If wrong measures
Big / Blue	Small / Red	Open circuit	Replace the head
Big / Blue	Small / Yellow	$12 < \dots < 14.6 \text{ k}\Omega$	Replace the head
Big / Blue	Small / Green	$3 \text{ k}\Omega$	Replace the head
Big / Blue	Big / Purple	About $0 \Omega$	Replace the head
Big / Blue	Big / Brown	Open circuit	Replace the head
Big / Blue	Big / Yellow – green	About $0 \Omega$ (since 09/1996)	Replace the head
Big / Yellow – green	Big / Brown	Open circuit	Replace the head
Big / Yellow – green	(shield) / Black or white	About $0 \Omega$	Replace the head
Big / Brown	Big / Orange	About $0 \Omega$	Replace the head

#### e) Checking Power Arm cable:

Check power arm cable continuity, the cable between tube head and Power board CJ 426. Using an Ohmmeter, measure continuity of each wire.  
If you find broken wires, replace the cable assembly (refer to the Installation Manual).

#### d) « Power Error » last test:

« V HEAT » led should light during pre-heat. If not, replace the board.

Check filament heating voltage (between test points « GND » and « V HEAT »), you should measure 3 or 4 Volts DC. If not, replace the board.



## g) Final check:

Program occlusal mode:

- Choose film type 9, 60 kV, 4 mA

Make an exposure and measure voltage between test point 0 mA and RTN MA (= mA)  
You should measure between **3.4 V and 4.6 V (4 V)**.

- Choose film type 9, 60 kV, 7 mA

Make an exposure and measure voltage between test point 0 mA and RTN MA (= mA)  
You should measure between **6.0 V and 8.0 V (7 V)**.

- Choose film type 9, 70 kV, 4 mA

Make an exposure and measure voltage between test point 0 mA and RTN MA (= mA)  
You should measure between **3.4 V and 4.6 V (4 V)**.

- Choose film type 9, 70 kV, 7 mA

Make an exposure and measure voltage between test point 0 mA and RTN MA (= mA)  
You should measure between **6.0 V and 8.0 V (7 V)**.

If your problem is not solved and if all these points are correct, **replace power board and hand-held timer (this is particularly relevant with the ceiling mount)**